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ABSTRACT

This report presents a new comprehensive design for licensing teachers. The design would require beginning teachers to complete a supervised internship as the penultimate step in the licensing process. Local school districts, operating under state guidelines, would be expected to make carefully planned internships available to all beginning teachers. Upon successful completion of the internship, the beginning teacher would be eligible to take the state-administered test of teaching skills. This test would assess the candidate's ability to analyze and respond to teaching situations. The design, adapted from study of licensing in other professions, represents a substantial departure from traditional and recent approaches to teacher licensing. It represents an effort to provide the public with a high level of assurance that novice teachers are fit to practice. (Author/JD)

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Licensing Teachers

Design for a Teaching Profession

Arthur E. Wise, Linda Darling-Hammond
With Barnett Berry, Stephen P. Klein

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Center for the Study of
the Teaching Profession

PREFACE

This report presents a new comprehensive design for licensing teachers. The design would require beginning teachers to complete a supervised internship as the penultimate step in the licensing process. Local school districts, operating under state guidelines, would be expected to make carefully planned internships available to all beginning teachers. Upon successful completion of the internship, the beginning teacher would be eligible to take the state-administered test of teaching skills. This test would assess the candidate's ability to analyze and respond to teaching situations. The design, adapted from study of licensing in other professions, represents a substantial departure from traditional and recent approaches to teacher licensing. It represents an effort to provide the public with a high level of assurance that novice teachers are fit to practice.

The major unsolved problem in teacher licensing is the inability of current procedures to determine when a novice teacher is fit for independent, autonomous, and, therefore, professional practice. For years, prospective teachers faced only those hurdles associated with passing courses in an approved teacher education program. Policymakers became convinced that negotiation of these hurdles did not prove that a prospective teacher was fit to practice. As a result, they have been imposing additional hurdles in the form of tests of basic skills, subject matter, and pedagogy. Yet, policymakers are experiencing a growing disquiet that negotiation of these hurdles still does not determine that a prospective teacher is fit to practice. As a result, they have been seeking an additional "test" by which to make this determination.

The first "test" of teaching skills, developed in Florida and used throughout the southeast and elsewhere, involves observing novice teachers at work and rating their teaching behavior according to a predetermined checklist. This first generation effort is correctly concerned with performance. However, the technique employed does not adequately discriminate between those who are and those who are not fit to practice.

The Minnesota Board of Teaching wanted a different approach. The board, under a mandate from the Minnesota Legislature to devise a system for evaluating the teaching skills of beginning teachers, selected RAND's Center for the Study of the Teaching Profession

(CSTP) to assist it with the development of a new design. Because the design can be adapted in any state, the CSTP has decided to make this report generally available.

SUMMARY

During the 1980s, public attention to the quality of education has increased policymakers' concern about the quality of teachers. In the context of the national movement to assess both the academic competence and the teaching skills of beginning teachers before full licensure, the State of Minnesota and its Board of Teaching have begun to revise entry standards into the teaching profession. To supplement new examinations that assess the reading, writing, and mathematics skills and academic knowledge, the State Legislature mandated that the Board of Teaching "develop a plan to evaluate, before a continuing license is issued, the teaching skills of beginning teachers."

Although it is relatively easy to assess basic skills and academic knowledge, evaluating *teaching skills* is a far more complex and less well-understood endeavor. The Board of Teaching asked RAND to help develop a plan to evaluate teaching skills. This report proposes a system of evaluation to ensure that teachers granted a continuing license will have the knowledge and skills needed to practice as full professionals.

This report presents a new approach to appraising performance. The design, adapted from study of licensing in other professions, requires a substantial supervised internship as a precondition to taking a new standardized (but decidedly not "multiple choice") test of teaching skills. The *combination* of these two capstone requirements is necessary and sufficient to provide the public with the assurance that novice teachers are fit to begin professional practice.

TEACHING AND PROFESSIONALISM

The argument for the professionalization of teaching is similar to the arguments that led to the transformation of other occupations into professions. The primary rationale is a need for quality control over a process in which a service is provided to a client who inevitably knows less than the provider. Teaching shares with the professions the reality that high-quality service results when the professional is free to apply general knowledge to the specifics of the client. The professional occupations have attempted to solve the quality control problem largely by substituting quality control over personnel for quality control over service delivery.

The professions have created an arrangement with states in which they have sought—and been granted—the right and the obligation to control the quality of their members. They have intensified (and lengthened) their educational requirements and installed testing procedures. These measures assure the public and themselves that new members are qualified to practice and should be licensed to practice. A first step in controlling membership quality and toward professionalization is the creation of a professional licensing examination that discriminates between those who are and those who are not qualified to practice.

PROFESSIONAL LICENSING

The basis for professionalism is a guarantee to the public that all entrants to the profession have adequately mastered the basic knowledge and skills needed to perform responsibly **before** *they are licensed to practice independently.*

The plan outlined in this report is intended to ensure that entrants to teaching have both the opportunity to master basic teaching skills and a fair and reliable vehicle for demonstrating this mastery. This will require the following changes (in addition to Minnesota's new subject-matter testing requirement):

1. Teacher preparation must be reconceptualized to include an internship year.
2. A candidate for a continuing license must present evidence to the Board of Teaching that he or she has successfully completed the internship.
3. The candidate for a continuing license must pass a state examination of teaching skills.

The best assurance that a novice is fit to practice a profession is to allow the novice to practice and to determine that the novice is practicing competently. The need for reliable determinations obliges professions to create a series of assessments for licensure, each of which weighs reliability, validity, and job relevance differently, but, when taken as a whole, convinces the profession and the public that the novice is fit to practice.

FINDINGS AND RESULTS OF ANALYSES

The Context for Change

The demographics of Minnesota's teaching force make this an ideal time for strengthening standards. Minnesota will experience only a moderate increase in demand for new teachers, with much of the increase occurring several years from now. This means that the state can take the time to carefully design a new system of teacher education and licensing and can test that system before the state experiences a major increase in the demand for teachers.

Other states will face an uphill climb as they struggle to produce teachers to respond to growing demand. Making teaching appealing is the long-term key to preventing shortages of teachers generally. Historical evidence suggests that strengthening standards, while also improving salaries and working conditions, may help to prevent, mitigate, or solve the shortage problem.

Dilemmas of Professional Testing

The principal purpose of the professional examination—an important tool in the licensing process—is to determine objectively if the prospective practitioner has an adequate understanding of basic concepts and the ability to apply those concepts to practical tasks. It screens out those not able to exhibit this knowledge and ability. A rigorous examination ensures that members of the profession have at least a minimum level of knowledge and, thus, begins to establish public trust.

Some believe that teacher testing alone will improve the overall quality of the teaching force by either eliminating incompetence or encouraging changes in teacher education. This belief rests on an assumption that the tests are good measures of teacher qualities related to effective teaching. But for existing tests, available evidence is not convincing.

Pencil-and-Paper Tests. Existing pedagogical examinations present a narrow ideological view of good teaching while oversimplifying the nature of teacher decisionmaking. Because the tests rely solely on multiple-choice responses to brief statements of professional problems, they fail to represent the complexity of the decisionmaking process or the full range of the professional knowledge base. The problem of adequately representing a complex knowledge base in a manner that allows assessment of skill in applying that knowledge intelligently is twofold: (1) Both the generalizability and limitations of particular "rules of practice" must be acknowledged; and (2) the reasoning process

for applying knowledge must be assessed. Unless professional examinations can achieve these goals, they will not adequately serve the interests of the profession and the public.

Performance Assessment. In some states, beginning teachers are granted an initial license to teach when they have satisfied educational and other certification requirements; but after they have secured a teaching job, they must also pass an on-the-job performance evaluation before being granted a continuing license.

This approach to performance assessment suffers from three major shortcomings: (1) The rating instruments seek to promise objectivity by specifying a set of uniform teaching behaviors that can presumably be tallied to measure competence in a small number of classroom observations; (2) the assessment systems do not evaluate candidates in similar job settings and performance situations; and (3) licensing assessments are made in part by employers who are also responsible for hiring and the granting of tenure, thereby entangling licensing and employment decisions.

Teacher Preparation and Teaching Practice. Existing instruments and methods for assessing teaching knowledge and skill are unable to fully capture the complexities of teaching knowledge and the context-dependent nature of teaching judgment. Because the acquisition of teaching skill is so dependent on developing judgment in complex, nonroutine situations, it cannot be adequately assessed until after the prospective teacher has had an opportunity to encounter and work through many of the common problems of teaching practice. As a training mechanism and a source of support to beginning practitioners, other professions require a form of structured internship before licensure.

Internship programs differ from current student teaching and beginning teacher programs in at least two ways: (1) They provide for graduated assumption of responsibility for client service; and (2) they require that all interns experience particular types of situations for decisionmaking and practice under supervision.

The internship experience extends professional training in a clinical setting without exposing clients to unsupervised novices or leaving to chance the acquisition of essential skills. Not incidentally, these types of programs are oriented more toward assistance and enhancing effectiveness than toward assessment, screening, and sorting, which are left largely to the licensure examination. *A supervised induction process is as necessary to the licensure process as are carefully formulated examinations of teaching skills and knowledge.*

Teacher Education

The Task Force on Teacher Education for Minnesota's Future has developed a set of standards to guide teacher education programs. They indicate what the licensing system should seek to assess and suggest how training opportunities should be structured.

The Task Force organized the desired attributes of effective teachers into three broad categories: the *dispositions* that beginning teachers should have; the set of teaching *skills* they should have, including the ability to make complex, elaborate, and multiple decisions; and the *knowledge* they must have.

In addition, there is a growing consensus that *teachers should be liberally educated and that they should have a major in the subject that they will teach.*

Furthermore, prospective teachers should know about human development, the psychology of learning, and pedagogy. This knowledge base, which is maturing and becoming more practical, can be incorporated into the undergraduate curriculum. But *the leading edge of opinion is that teacher education cannot be accomplished within a four-year undergraduate curriculum and should be accomplished at the graduate level.*

After theoretical professional and pedagogical knowledge is acquired, it must be converted to practical knowledge through a supervised experience. For this reason, the candidate's professional and pedagogical knowledge should be tested in conjunction with the evaluation of his or her teaching skills following an internship year.

RECOMMENDATIONS FOR A PROFESSIONAL LICENSING SYSTEM

On the basis of these findings, we have developed a new approach to evaluating the teaching skills of beginning teachers. The approach is designed to assure that the beginning teacher is fit to receive a continuing license (Minnesota's term for a full-fledged license).

The Internship

An internship should be an integral component in teacher education and a prerequisite for licensure. As in other professions, a teacher must have an opportunity to put theory into practice, to learn those aspects of the job that cannot be taught in the professional school classroom, and to practice complex decisionmaking under the supervision of experienced practitioners. Skills in managing the learning process are

developed by working with students and by selecting learning materials, assessment tools, and teaching strategies through observation and practice guided by direct supervision, counseling, reviews of practice, and formal instruction. As interns progressively gain more knowledge and skill, they are provided greater latitude to make decisions and teach students, but always under supervision.

The internship year cannot be undertaken until a candidate has completed all of the other requirements for state certification, including graduation from an accredited program of teacher education and passage of the state tests of reading, writing, and mathematical skills and subject-matter knowledge in the field for which licensing will be sought.

An internship program must assure that its graduates will possess sound clinical judgment, a high order of knowledge about the evaluation of student needs, appropriate teaching strategies for meeting the needs of students and the demands of the discipline, and the means for developing and sustaining a sound learning environment.

A program must have an explicit curriculum composed of (1) formal instructional experiences, such as regularly scheduled lectures, seminars, clinical conferences, observations of other teachers, and required reading assignments; and (2) clinical experiences in which the intern assumes progressively greater responsibility for student learning. As the result of the program, the beginning teacher should be able to exhibit a broad range of professional knowledge and skills.

In addition, an internship should be characterized by an adequate variety of students and types of classes, an optimal teaching load, teaching conferences, and a critical mass of faculty resources and interns.

The sponsoring institution may be a school district or a consortium of school districts, and should ideally include the participation of one or more colleges of teacher education. The sponsoring institution is responsible for designating a director, supporting faculty time, establishing a process for distributing institutional resources, establishing an operational system, establishing policies for intern counseling and evaluation, providing for periodic review of each program, providing adequate facilities and resources, and securing program accreditation.

A period of development is necessary before the internship can be fully phased-in. The Board of Teaching should design and administer a grant competition, which will encourage alternative approaches to the design of internships that meet specifications established by the Board. Eligible grantees will be school districts or consortiums of school districts, independently or in cooperation with colleges of education. School districts must assume the lead for the simple reason that they will employ (and pay) interns.

Test of Teaching Skills

Upon successful completion of the internship, the candidate for a continuing license will be eligible to take the Board of Teaching Test of Teaching Skills. Rather than test discrete behavioral skills or recall of prescribed responses, *the test will assess the candidate's ability to exhibit skills of analyzing teaching situations and producing effective responses.*

The Test of Teaching Skills should be based on principles that must govern licensing tests:

- Specific knowledge and skills should be tested only after candidates have had an opportunity to master them.
- Testing for licensure should include assessment of a broad range of requisite knowledge and skills.
- Licensure tests should be based on a generalizable and reliable assessment of knowledge and skills.

The Test of Teaching Skills also needs to be developed. The test will assess such knowledge and skills as:

- Analysis and interpretation of information about students' learning characteristics, cognitive styles, stages of cognitive and psychological development, and levels of achievement;
- Assessment of student learning and progress, including performance abilities, understandings of subject areas and concepts, and types of misconceptions students may hold;
- Selection of appropriate teaching materials and strategies to address curricular goals in the context of students' acquired abilities, understandings, and stages of development.

The proposed test, based upon lessons learned from other licensing tests, is well within the state of the art. Options for the test need to be generated and assessed. Costs will vary depending upon the nature of test stimuli (written, oral, video) or on the nature of responses (written, oral, taped). After the test has been given a few times, a validity study should be conducted.

General Plan for Licensure

Licensure should be a three-stage process: entrance licensure, internship, and continuing licensure.

Entrance licensure is granted if the candidate passes the tests of reading, writing, mathematics, and subject matter. These examinations are prerequisites for internship positions.

The internship is an educational experience. Its primary purpose is to improve the teaching skills of beginning teachers. It gives candidates experience in applying the knowledge they gained in their academic training to actual day-to-day teaching activities. Thus, it provides them with an opportunity to practice, under supervision, skills that will be tested on the examination for a continuing license.

Candidates are eligible to take the Test of Teaching Skills only if they satisfy the internship requirement and receive the endorsement of the director of their internship program.

A continuing license is granted after the candidate passes a test of his or her ability to carry out many of the important tasks and activities that teachers are expected to perform. Ideally, the test will include both written and oral tasks that assess the degree to which the teaching skills defined by the Board of Teaching have been acquired.

This approach mirrors those recently pursued in architecture, engineering, medicine, and law, and can capitalize on the test development technologies now used in these professions. It emphasizes performance assessment and the ability to apply knowledge in specific types of teaching situations. These types of performance assessments have been found to enhance the credibility of examinations in the eyes of candidates, practicing professionals, and the public.

Establishing rigorous standards is the first step. Of equal importance is the political determination to enforce those standards. A professional licensing system will not generate public confidence and trust if its requirements are not enforced or are unevenly enforced. The Board of Teaching will have to have sufficient legal and moral authority to withstand pressure to compromise standards if demand exceeds supply.

ACKNOWLEDGMENTS

Our first debt is to the Minnesota Board of Teaching and to Kenneth L. Peatross, its executive secretary. We think it is no accident that a state with one of the nation's first boards of professional teaching standards is at the forefront of establishing meaningful standards for licensing teachers. The board framed the questions we were to answer in a manner that invited us to design a professional licensing system.

A draft of the report was reviewed by Robert L. Egbert, George W. Holmes Professor of Education at the University of Nebraska, Lincoln; Robert H. Koff, Dean of the School of Education, State University of New York at Albany; and Neil Carey of The RAND Corporation. These reviewers obliged us to tighten our arguments and to help our readers see the broader context. Shirley Lithgow helped us get it all done; Patricia Bedrosian and Alvin Ludwig eased the reader's burden.

The project could not have been undertaken or completed or the report made available nationally without the support provided to the Center for the Study of the Teaching Profession by the James S. McDonnell Foundation, Conrad N. Hilton Foundation, Aetna Life and Casualty Foundation, and the Metropolitan Life Foundation.

The authors retain the full responsibility for perpetrating another scheme that will require a serious commitment of time, effort, and resources to be done well.

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I. INTRODUCTION

Public concern about the quality of education and a sharp decline in the number of college students entering teaching during the 1980s have focused policymakers' attention on the quality of teachers.[1] State governments have responded to this public concern by enacting and implementing a wide range of policies and programs to improve the quality of their teaching forces. A great deal of this activity has been directed toward the licensing of new teachers.

According to a recent survey, 46 states now require some form of teacher testing before state licensure (Sandefur, 1986). Twenty-five states require new teachers to pass a test before entering teacher education programs. Most states also now require students in teacher education programs to maintain a minimum grade point average. In addition, 41 states require some form of testing as a condition of state licensure. Eleven states require on-the-job evaluation of classroom performance before full licensure (Goertz, 1986).[2]

In the context of this national movement to assess both the academic competence and the teaching skills of beginning teachers before full licensure, the State of Minnesota and its Board of Teaching have begun to revise entry standards into the teaching profession.

Starting in April 1988, teachers seeking licensure in Minnesota will need to pass examinations demonstrating certain competencies. The State Legislature has required that the Board of Teaching adopt examinations assessing prospective teachers' reading, writing, and mathematics skills, as well as their academic knowledge in each field of licensure, as the basis for receiving an entrance license valid for two years. The legislation specifies that these tests of academic knowledge should *not* seek to assess teaching skill or other professional topics. This restriction was imposed because of the legislature's skepticism that teaching knowledge could be well-tested with the kinds of

[1]National Commission on Excellence in Education (1983); National Commission for Excellence in Teacher Education (1985); California Commission on the Teaching Profession (1985); Governor's Commission on Equity and Excellence in Education (1985); National Governor's Association (1986); The Holmes Group (1986); and Task Force on Teaching as a Profession (1986).

[2]Throughout this report, we use the term "licensure" to describe state requirements for regulating individuals' opportunities to teach in a given state. Although many states use the terms "certification" and "licensure" to describe their programs, "certification" in most professions refers to certification of a practitioner's knowledge by a professional body, whereas "licensure" refers to permission to practice by a state government. We adhere to this usage.

multiple-choice instruments currently available. Instead, the legislature mandated that the Board of Teaching "develop a plan to evaluate, before a continuing license is issued, the teaching skills of beginning teachers."

The Board of Teaching selected The RAND Corporation to assist in the development of this plan. As part of its assistance, RAND staff (1) reviewed the context within which a state plan for assessing the skills of beginning teachers must be implemented; (2) reviewed and analyzed research literature related to beginning teacher evaluation; (3) reviewed nationwide developments in the testing of beginning teachers; and (4) reviewed and analyzed how other professions assess the skills of their new members before licensure.

On the basis of these reviews and analyses, RAND developed a new approach to evaluating the teaching skills of beginning teachers. This plan was reported to the education committees of the Minnesota State Legislature and was subsequently endorsed by them. The approach has several requirements. First, teacher preparation must be reconceptualized to include an internship year. Second, a candidate for a continuing license must present evidence to the Board of Teaching that he or she has successfully completed the internship. Third, the candidate for a continuing license must pass a state examination of teaching skills. Taken together, these three requirements (in addition to the already proposed examinations) will warrant that the beginning teacher is fit to receive a continuing license (Minnesota's term for a full-fledged license).[3] Existing approaches to evaluating the teaching skills of beginning teachers (such as those in Georgia and Florida) do not provide this assurance. Existing approaches in other professions (such as architecture and medicine) do provide this assurance. Our recommendation, therefore, is based upon the approaches successfully used in other professions.

TEACHING AND PROFESSIONALISM

Understanding the need for a professional licensing examination requires first a look at the rationale for professions and for a profession of teaching. Webster's dictionary defines profession as:

[3]As in other professions, testing may not screen out those who are morally and ethically unfit; however, the internship provides an opportunity to assess a candidate's fitness to practice.

> A calling requiring specialized knowledge and long and intensive preparation including instruction in skills and methods as well as in the scientific, historical, or scholarly principles underlying such skills and methods, maintaining by force of organization or concerted opinion high standards of achievement and conduct, and committing its members to continued study and to a kind of work which has for its prime purpose the rendering of public service.

Because of these attributes, professions require substantial evidence that those admitted to practice have been well-trained and socialized to professional codes of conduct. Generally, these include rigorous and lengthy training, intensively supervised clinical experiences, examinations for state licensure and professional certification, and control over entry and continued membership by professional standards boards. Teaching has many of the features of a profession—it is certainly an important public service occupation requiring specialized knowledge—but it has few of the professions' requirements for membership. Training is fairly short and may be waived when teachers are in short supply. Supervised induction is rare, and few means exist for enforcing professional standards of achievement and conduct.

The argument for the professionalization of teaching is similar to the arguments that led to the transformation of other occupations into professions (Starr, 1982). The primary rationale is a need for quality control over a process in which the service provider, in a largely private transaction, provides important services to a client who inevitably knows less than the service provider. How can the state or society or the client be assured that the appropriate services—those that best serve the client's welfare—are being delivered? Aside from professionalization, there are three possibilities: regulation of practice, inspection of practice, and inspection of outcomes. These are means of quality control that are most useful when practice can be readily standardized, when routine procedures produce predictable results, and when outcomes are easily measured. In other kinds of work—where complexity requires nonroutine judgments based on extensive knowledge and analysis of many, competing considerations—assurance of practitioner knowledge and skill provides the basis for another solution to the quality control problem. Professionalization is the means by which occupations of this type ensure appropriate practice.

With regard to educational services delivered in schools, there are not necessarily mutually exclusive means of quality control. First, school authorities may mandate teaching content and, perhaps, teaching method. Authorities may mandate course content, learning objectives, textbooks, other materials, and methods of instruction to be used. Of course, there is no assurance that teachers will follow these

mandates once they close the classroom door. If they do, there is still the question of whether the prescribed procedures will produce the desired outcomes. Second, school authorities may supervise teachers engaged in teaching to ascertain that they are following the prescribed content and methods. Yet, occasional observation of classroom activity, the most common form of supervision, is not likely to reveal whether full compliance with mandates is occurring. Intensive supervision of instruction would require a supervisory ratio that would be prohibitively expensive. Third, school authorities may monitor the outcomes of instruction by external examinations given to students. Yet, external examinations, generally standardized multiple-choice tests, do not reveal all the desired outcomes of instruction and may exercise a distortionary effect on instruction and learning. Moreover, such examinations bring into bold relief questions of the relationship between a given teacher's efforts and the scores students earn on tests, the appropriateness of learning objectives for particular students and classes, the appropriateness of instruction offered, and the appropriateness of the examinations themselves given the learning objectives.

The appropriateness of instruction, like the appropriateness of other professional services, must be determined by context. Because students are not standardized in their needs, stages of development, preconceptions, or learning styles, a given stimulus (textbook, teaching behavior, or curriculum package) does not produce a predictable response. A teacher must make many decisions, based on knowledge of the student, as well as of the subject matter, and of a range of pedagogical "treatments," to produce the conditions for learning. And what is learned is so vast as to defy easy, standardized measurement. Teachers must address complicated questions. Are particular learning objectives appropriate for particular students at a given time? What are appropriate materials and methods for achieving the objectives that are appropriate? How will their attainment be judged to accurately assess learning while maintaining other necessary conditions for student success such as self-esteem and motivation? In fact, appropriate instructional decisions must be made at the point of service delivery. The quality of services delivered depends inevitably upon the capacity of the teacher to make the correct decisions.

It has long been noted, and sometimes lamented, that teachers are in control once they close the classroom door. Just as autonomy is a problem in other professions—indeed, it is the problem that gives rise to professionalism as a solution to the quality control dilemma—so it is in teaching. In fact, many recent regulatory efforts to "teacher-proof" the curriculum were designed to overcome this closed-door limitation on managerial control. However, many of these efforts had

counterproductive effects, precisely because they ignore the complexities of teaching (Darling-Hammond and Wise, 1985).

The problem then becomes how to assure quality instruction based upon appropriate instructional decisions when school authorities cannot simply prescribe good instructional practice, do not have the resources to closely supervise all teachers, and cannot rely solely on external examinations as the measure of instruction.

The problem of teaching is not unique. It shares in common with other professions the reality that high quality service cannot be prescribed in advance of the professional-client interaction. High quality service results when the professional is prepared to apply general knowledge to the specific needs of the client. High quality service does not result when the professional lacks the knowledge or the ability to analyze client needs. High quality service might be assured if professionals were intensively supervised in a manner that could take all of the relevant contextual considerations into account. But extensive supervision of this sort is unrealistic.

The occupations now known as professions have attempted to solve the quality control problem by substituting quality control over personnel for quality control over service delivery. The professions have attempted to assure the competence of neophytes before allowing them to become full-fledged members.

The professions have created arrangements with states in which they have sought—and been granted—the right and the obligation to control the quality of members of their professions. As the bargain is struck, professions have intensified their educational requirements and have installed testing procedures designed to assure the public and themselves that new members are qualified to practice and should be licensed to practice. In this way, the professions seek to assure the public and themselves of a high quality of service by individual members. The arrangement is not perfect—it is merely a lot better than the alternatives. Such bargains have been struck by medicine and law and, increasingly, by architecture, accounting, nursing, and engineering—all occupations that require discretion and judgment in meeting the unique needs of clients.

Some may wonder about the relevance of the experience of these professions for teaching. Reasoning by analogy is risky, for one may make inferences that are not appropriate or relevant to the case at hand. Public school teaching takes place exclusively in a nonprofit, bureaucratic, publicly accountable setting. Most members of other professions operate in a market setting where client choice and profit play a role. These major differences, however, do not vitiate the reality that knowledgeable professionals are making decisions in behalf of less

knowledgeable clients in settings where no "higher authority" (except professional ethics) is present. It is to protect the public that certain occupations have been granted professional status by society and state. A first major step toward professionalization is the creation of a professional licensing system that discriminates between those who are and those who are not qualified to practice.

PROFESSIONAL LICENSING

The basis for professionalism is a guarantee to the public that all entrants to the profession have adequately mastered the basic knowledge and skills needed to perform responsibly *before* they are licensed to practice independently.

The plan to be outlined in this report is intended to ensure that entrants to teaching have both the opportunity to master basic teaching skills and a fair and reliable vehicle for demonstrating this mastery. In addition, it holds promise for improving the overall quality of teaching practice by acknowledging the complexity of teaching and encouraging, through assessment, the acquisition by candidates of a broad set of understandings and abilities.

The plan to be proposed is similar to the approaches used in other professions to safeguard the public interest. However, no state has yet adopted this approach for licensing teachers. Until very recently, most states have granted licenses to teachers on the basis of their having graduated from a state-approved teacher preparation program. In the last decade, states have added requirements for testing as a condition of licensure; most of these are basic skills or subject matter examinations. States that seek to assess teaching knowledge and skill have relied either on multiple-choice paper-and-pencil tests of professional knowledge or on-the-job assessments of performance. As we discuss in Sec. III, the former approach cannot adequately assess the ability of candidates to apply knowledge with sound judgment in nonroutine, complex teaching settings. The latter approach does not provide a comprehensive, fair, reliable, or generalizable assessment of teaching knowledge and skills.

All professions face a quandary as they seek to develop a certification/licensing system that will assure the public that new members are fit to practice. The best assurance that a novice is fit to practice is to allow the novice to practice and to judge whether the novice is practicing competently. However, the demands for reliability and validity in that determination have obliged professions to create a series of assessments for licensure. Each of these assessments weighs

reliability, validity, and job relevance differently. However, the series, taken as a whole, convinces the profession and the public that the novice is fit to practice. Medicine and architecture provide good examples.

Most medical school students and graduates take the three-part National Board of Medical Examiners test (NBME). This staged examination reveals the interplay among assessments for entry to medicine. Part I is a multiple-choice examination of basic medical sciences, the first part of the medical school curriculum. Part II is a multiple-choice examination of the clinical sciences, the second part of the medical school curriculum. Part III focuses on clinical skills and the ability to apply knowledge to evaluate patient information and to make appropriate decisions regarding treatment. However, the medical school graduate is not allowed to take Part III until he or she has successfully completed an internship. There are two reasons. The first is that the graduate requires an internship to learn how to apply knowledge and make decisions. The second is that Part III is an incomplete test of clinical skills. The medical profession has recognized that the final test must be highly reliable. It may not, however, be sufficiently valid to be the sole basis for determining competence for practice. By insisting that the candidate successfully complete an internship, the profession has another measure of performance. It is valid on its face because it involves the actual delivery of service to patients. Because the rating of the intern's performance in the internship is necessarily subjective, it cannot be used directly for the licensing decision. The dual requirement for satisfactorily completing the internship and passing the Part III clinical skills test balances the demands for reliability, validity, and job relevance and provides the assurance that neither alone could provide.

Architecture has created a similar balance. To become a registered architect, a person must pass the Architectural Registration Examination (ARE). To sit for the ARE, candidates must accumulate a combination of education and experience. Candidates complete an accredited program in architecture, but before they are eligible to take the examination, they must show proof of at least one year's experience working under a registered architect. During this period, they must accumulate units of credit in 14 areas such as site analysis and design development. This experience qualifies them to take the examination. Most of the examination consists of multiple-choice questions; certain questions require candidates to produce graphic responses. Again, the profession expects that candidates will, during an internship phase, learn how to apply theoretical knowledge to practical problems. Most candidates for the license, in fact, work under supervision for several years.

This means that they have to perform sufficiently well that a registered architect in private practice is willing to continue to employ them. This "test" has face validity but obviously does not have a high degree of reliability. However, in combination with a reliable, valid examination, it provides a level of assuredness concerning the competence of a new architect.

Teaching must also wrestle with this quandary. Minnesota has already decided to test prospective teachers' knowledge of reading, writing, and mathematics and subjects to be taught. To these requirements, we propose adding:

- An internship so that candidates can acquire and demonstrate teaching skills;
- A reliable and valid test of teaching skills.

These two will meet the legislative intent of assuring that teachers granted a continuing license have acquired the knowledge and skills needed to practice as full professionals.

II. THE CONTEXT FOR CHANGE

Any change in the teacher licensure procedures in Minnesota must take into account current teacher demographics and current state licensure procedures. It is also informative to consider the state and national impetus for change.

The imposition of new licensing standards is often profoundly affected by the nature of the teaching force and by supply and demand pressures. When demand for new teachers exceeds the supply, standards are often lowered to enlarge the pool of candidates that may be hired. This can occur by allowing emergency licenses to be issued or by waiving specific requirements. This response to supply and demand pressures, though, can create long-term difficulties in maintaining a steady stream of qualified applicants. By lowering standards to satisfy immediate demand, states lower the status of the occupation and undermine market responses that would push salaries into equilibrium with market forces of supply and demand. In the long run, this depresses the supply of qualified applicants.

Furthermore, a sustained period of trading off quality for quantity reduces the public's confidence in the competence of a profession and in the entire educational enterprise. This gives rise to the kinds of reform proposals for regulating both teachers and teaching referred to above. On the other hand, increased teacher demand often gives rise to interest in raising both standards *and* salaries (Sedlak and Schlossman, 1986). The outcomes of particular state efforts to reexamine their entry standards for teachers depend on these factors, along with current practices and contemporary theories of teaching.

TEACHER DEMOGRAPHICS IN MINNESOTA

The demographics of Minnesota's teaching force make this an ideal time for strengthening standards. The state employs approximately 40,000 teachers who teach approximately 702,000 students in 435 school districts. Most of these school districts are small and located in rural areas of the state. In fact, 184 school districts have fewer than 500 students and 104 districts have between 500 and 1000 students. Median district enrollment is 651 and average district enrollment is 1613.

Approximately 37 percent of the state's teachers are over the age of 45. In fact, about 25 percent of the workforce is between the ages of 45

and 54 years of age. In addition, 11,639 of the state's approximately 40,000 teachers have over 20 years of experience. With early retirement incentives, many of these teachers will be eligible to retire within the next decade.[1]

State officials report that changes in Minnesota's public school enrollments will vary by grade level and geographic area. Increased births in the late 1970s mean that elementary school enrollments will grow significantly during the 1980s. State officials project that elementary school enrollments will remain stable during the 1990s and will decline during the late 1990s. They also project that secondary school enrollments will decline through the 1980s, then will rise and stabilize during the 1990s (Minnesota Higher Education Coordinating Board, 1984).

Consequently, state officials project that the demand for new teachers will also vary by level and geographic area. By making assumptions about birth rates, pupil to teacher ratios, retirements (a 10 percent annual retirement of teachers over the age of 54), and attrition (a 1 percent annual attrition of teachers under the age of 54), state officials have concluded:

- Demand for elementary school teachers, under the stated assumptions, would increase by over 5000 between 1982–1983 and 1992–1993 because of growth in enrollments and attrition in teachers as a result of retirement and other factors.
- Demand for secondary school teachers, under the assumptions, would increase by over 1300 between 1982–1983 and 1992–1993 because of growth in enrollments and reductions in the number of continuing teachers as a result of retirement and attrition. This increased need, however, would develop following the late 1980s when a surplus of several hundred secondary school teachers could exist (Minnesota Higher Education Coordinating Board, 1984).[2]

These findings suggest that increases in demand, though not trivial, will be sufficiently staged over a period of time that severe shortages

[1]Minnesota Statute 356.70—the "Rule of 85"—makes teachers (and other state employees) whose age and years of experience total 85 eligible to retire with full benefits. This means that many teachers, who began teaching immediately after graduating from college, may retire as early as age 53 or 54.

[2]These projections are fairly conservative, given the assumptions on which they are based: Constant pupil/teacher ratios assume no improvements in class size over the decade; the assumed attrition rates for retirement-eligible and other teachers are lower than would generally be expected given early retirement incentives and an increasing number of new teachers, who normally experience much higher levels of attrition than other teachers.

are unlikely. Changes in licensing standards could be implemented before cumulative demand reaches much higher levels than at present. However, state officials offer several caveats with regard to these conclusions:

> These data are statewide in nature and do not reflect circumstances in every school district. Districts with modest fluctuations in enrollments may be able to absorb the changes by tolerating slightly greater or smaller class sizes without hiring or laying off teachers. In contrast, districts with significant increases or decreases in enrollments may have to adjust their complements of teachers.
>
> The data also do not take into account demand for teachers by subject area, an important factor for secondary schools. Recent discussion about expanding the requirements for math, science, and foreign language instruction has led to concern that shortages of teachers will emerge in these fields (Minnesota Higher Education Coordinating Board, 1984).

State officials have not recently assessed the full extent to which Minnesota will have an adequate supply of teachers. Although the state's production of teacher education graduates has declined steadily over the last two decades and the demand for elementary education and selected secondary education teachers is predicted to increase, large numbers of inactive but licensed teachers may provide an adequate supply of teachers for the near future. Unfortunately, state officials, at this time, have no accurate way of knowing under what circumstances (if any) these licensed teachers would offer their services as future public school teachers.

In 1985–1986, Minnesota schools hired 4769 teachers. Of these, one-third were new college graduates, a slight increase from the previous year's 31 percent. The balance were Minnesota teachers returning to teaching (25 percent), in-state transfers (31 percent), and experienced immigrants from out-of-state (11 percent).[3] Of the 3355 new and returning teachers who were not in-state transfers, nearly half (1634) were beginning teachers. If these proportions remain stable, and the department's projections regarding increases in demand are correct, Minnesota will be hiring about 2000 beginning teachers per year between 1987–1988 and 1992–1993.[4] By the end of this period, about one-fourth of all teachers in the state will have begun their teaching careers under Minnesota's new teacher licensing procedures.

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[3]Data from the Minnesota State Department of Education Personnel Licensing Division.

[4]This estimate is based on the assumption that the state's projected increase in demand of about 630 new teachers annually, added to the 3355 hires in 1985–1986, will bring total new hires to about 4000 annually, and that, as in 1985–1986, about half of these new hires each year will be beginning teachers.

It appears that Minnesota will experience a moderate increase in demand for new teachers, with much of the increase occurring several years from now. This means that the state can take the time to carefully design a new system of teacher education and licensing and test that system before the state experiences a major increase in the demand for teachers. The time for change is ideal. The state can build its capacity for selection and induction of new teachers before there is a supply problem that might weaken efforts to establish and enforce standards.

Other states will face teacher demand and supply situations different from Minnesota's. These states may face an uphill climb as they struggle to produce teachers to respond to growing demand (Grissmer and Kirby, 1987). The proper strategy for them to pursue may be the counterintuitive one. Strengthening standards, when accompanied by improvements in salaries and working conditions, may help to prevent or mitigate the shortage problem. Throughout the 20th century, standards for entry to teaching have been rising despite some turbulence produced by periodic shortages. And rising standards, coupled with concurrent salary increases, have contributed to the solution of short-term shortage problems (Sedlak and Schlossman, 1986). Recent increases in the proportion of college freshmen interested in teaching have coincided with simultaneous efforts to raise both salaries and standards for teachers (American Council on Education, 1987).

Making teaching appealing is the key to preventing shortages of teachers generally. With respect to shortages of specific types of teachers, the solution is the same. Current shortages of minority teachers are largely the result of declining interest in teaching because of the availability of other, more attractive career opportunities. Similarly, shortages of mathematics and science teachers result from opportunities potential recruits find in other fields (Darling-Hammond and Hudson, 1987). Members of minority groups are likely to respond to changes in incentives for teaching. Prospective mathematics and science teachers are likely to do the same.

CURRENT LICENSING IN MINNESOTA

Teacher Education and Licensure

Presently, the regulation of teacher preparation institutions and programs is the primary method of state oversight of teacher quality. Thus, the authority to evaluate individual applicants for initial teacher licenses is effectively delegated to faculty who assess undergraduate

coursework and student teaching practicums. Teacher licensure is tied directly to graduation from an approved teacher education program.

Institutional approval (conducted every ten years) by the Minnesota Board of Teaching is the first step in regulating the quality of the state's beginning teachers. Once approved by the Board of Teaching, institutions seek separate approvals for individual programs. Program approval and present licensing standards for teachers are linked directly because graduates of approved programs automatically receive an entrance license, valid for two years, upon application.

The process for approving the 48 different teacher education program and licensure areas parallels the institutional approval process except that the review is conducted every five years. The institution begins by submitting a description of the program, demonstrating how specific program requirements have been met. Faculty qualifications and teaching assignments also are submitted for review. Although initial approval may be given on the basis of written information, the program is eventually visited by an evaluator who verifies the written descriptions. This process is similar to that used in many other states for program approval as the basis for allowing institutions to license teachers. However, Minnesota may be more selective than some other states in granting this authority to institutions. Durings its last five-year review cycle of teacher education programs, the Board of Teaching approved 73 percent of the programs unconditionally, 20 percent conditionally for one year, and disapproved 7 percent (Minnesota Higher Education Coordinating Board, 1984).

The experiences of candidates attending different approved programs, though, may be quite varied. In 1984, the Minnesota Higher Education Coordinating Board examined the content of selected teacher education programs at 14 colleges and universities in the state.[5] The board reported that, across these institutions, liberal arts courses constitute 33 to 75 percent of the required coursework for a degree in elementary education. The institutions require that one-third of the degree program be in general education. Some teacher education programs require additional liberal arts coursework—taken as a minor or as a concentration. In addition, 25 to 30 percent of the required coursework consists of education-related courses. When education fields are chosen as concentrations or minors as well, students may take up to 70 percent of their courses in education.

The Board of Teaching requires that the general education requirements for secondary education majors and noneducation majors be

[5]The institutions were selected because they accounted for 88 percent of all new in-state teachers prepared to teach in 1983.

equivalent. Additional subject area coursework is mandated for each program. Subject area coursework requirements range from 22 to 45 percent of the baccalaureate program, with most programs requiring that about 33 percent of a student's coursework be devoted to his or her major field of study. In some teaching fields, secondary education majors are required to take more hours in their academic discipline than a regular major in the same discipline. The Board of Teaching requires that secondary education majors take 27 quarter hours of professional education courses. When human relations and drug education requirements are included in the professional education sequence, secondary education majors take 18 to 25 percent of their course work in education-related areas.

Procedures for Licensure

The Board of Teaching stipulates that the initial teaching license be an *entrance license*, valid for two years. A *continuing license*, valid for five years, is issued to an applicant holding an entrance license who has completed at least one year of teaching experience in the licensure area.

As noted, beginning in 1988, the state legislature has mandated that teachers seeking an entrance license in Minnesota will need to meet specific standards on appropriate criterion-referenced tests of subject matter knowledge in their teaching field. In addition, prospective teachers will have to pass examinations assessing reading, writing, and mathematics skills. Finally, beginning teachers will have to pass a test of their teaching skills before a continuing license is granted.

Teacher licensure procedures in Minnesota are similar to those that have been in effect in most states for many years. Until the recent introduction of licensure tests across the country, virtually all states had licensed teachers based solely on their graduation from state-approved programs. This left the licensure decision squarely in the laps of the same institutions charged with preparing teachers. In the context of variable standards for program approval and for candidate graduation, and with loopholes available (through emergency licensure) for avoiding preparation programs altogether, this has meant the hiring of teachers with substantially different types and levels of training and skill. It is this variability that has led to the reexamination of state procedures for licensing teachers.

Table 1

STATES MANDATING COMPETENCY ASSESSMENT OF TEACHERS—1986

State	Mandate		Date		Level		Skills Tested				Type of Tests	
	Legislative	State Board of Education	Mandated	Implemented	Admissions	Certification	Basic	Professional	Academic	On-the-Job	National Std.	Customized
Alabama		x	80/81		x	x	x	x	x		ACT/SAT	x
Arizona	x	x	80/81		x	x	x	x			PPST	x
Arkansas	x	x	79/83			x	x	x	x		NTE	x
California	x		81/83		x	x	x		x		CBEST/NTE	x
Colorado	x		81/83		x	x	x				CAT	
Connecticut	x	x	82–85/83–87		x	x	x	x	x		x	
Delaware		x	82/83			x	x				PPST	
Florida	x		78/80		x	x	x	x		x		x
Georgia		x	75/78			x		x	x	x		x
Hawaii		x	84/86			x	x	x	x		NTE	
Illinois	x		85/86–88		x	x	x					x
Indiana	x		84/85		x	x	x	x	x		NTE	x
Kansas	x		84/86			x	x	x			PPST/NTE	
Kentucky	x	x	82/83–85		x	x	x	x	x	x	NTE	
Louisiana	x		77/78			x	x	x	x		NTE	
Maine	x		84/88			x	x	x	x		NTE	
Maryland		x	86/87			x	x	x	x		NTE	
Massachusetts		x	79/82			x	x	x	x			x
Minnesota	x		85/88				x		x		NTE	
Mississippi	x	x	82/86		x	x	x	x	x	x	NTE	x
Missouri		x	81/85		x		x				ACT/SAT	
Montana		x	85/86			x	x	x	x		NTE	
Nebraska	x		84/86		x		x				PPST	
Nevada		x	84/86		x	x	x		x	x	?	?
New Hampshire		x	84/85			x	x				PPST	
New Jersey		x	84/85			x	x		x		NTE	
New Mexico	x	x	81/83		x	x	x	x	x		NTE	
New York		x	84/84			x	x	x		x	NTE	
North Carolina		x	79/82		x	x	x	x	x	x	NTE	
North Dakota		x	86/		x	x	x	x	x		?	?
Ohio		x	85/87		x	x	x	x	x			
Oklahoma	x		80/82			x	x	x	x	x		x
Oregon		x	82/85		x	x	x				CAT	
Pennsylvania		x	84/87			x	x	x	x	x	?	?
Rhode Island		x	82/86			x	x	x			NTE	
South Carolina	x		79/83		x	x	x	x	x	x	NTE	
South Dakota		x	85/86			x	x	x	x	x	NTE	
Tennessee		x	79/79		x	x	x	x	x		PPST/NTE	
Texas	x		81/84–86		x	x	x	x	x	x	PPST	x
Utah		x	79/80		x		x				?	?
Vermont		x	80/82			x		x	x	x		x
Virginia	x		80/85			x	x	x	x	x	NTE	x
Washington		x	78/83–87		x	x	x	x				x
West Virginia		x	82/85			x	x	x	x		?	?
Wisconsin		x	86/87		x	x	x		x		?	?
Wyoming		x	82/82		x		x				CAT	
Totals 46	20	32			25	41	44	32	31	14	31	16

SOURCE: J. T. Sandefur, "State Assessment Trends."

THE IMPETUS FOR CHANGE

A teaching force of variable quality undermines public trust. To create trust, states must construct teacher education and licensing systems that assure the public and policymakers that those who successfully negotiate the system are fit to teach. Many argue that teaching should be professionalized to enhance public trust. Professions, unlike other occupations, require that members acquire and demonstrate the capacity to perform *before* they are allowed to perform without supervision as full members of the profession. A distinguishing characteristic of a profession is that it clearly distinguishes between novices, who must be supervised, and full members of the profession, who are expected to function without supervision. A prospective teacher would have to acquire and demonstrate the capacity to teach before full membership in the profession and with it, would be granted the license to practice independently. This reform would follow the path taken by those occupations now called professions.

The recent concern over the quality of public school teachers has set the stage to implement new standards for entry into teaching. Over the last few years, most states have increased these standards by requiring that prospective teachers pass standardized tests before they are issued an initial state license. Some have required tests as a condition for entry into teacher preparation programs.

According to a recent survey by J. T. Sandefur for the American Association of Colleges for Teacher Education (1986), 46 states report the use or development of statewide entry, exit, or certification examinations (see Table 1). The multilevel certification processes used by these states require that teachers pass either paper-and-pencil or performance assessment examinations before full licensure, or both.

Sandefur (1986), in his survey of teacher assessment trends, noted that:

> Twenty-five states require testing for admission to teacher education programs. The Preprofessional Skills Test (PPST) and the California Achievement Test (CAT) are the most commonly used tests, although a few states have minimum required scores on the Scholastic Aptitude Test (SAT) and the American College Test (ACT). All of the admissions tests reflect the concern that applicants to teacher education programs be competent in the basic skills of communications and mathematics. In most states, students in teacher education also are required now to hold minimum grade point averages in excess of those required for retention in the institution. Typical GPA requirements range from 2.2 to 2.5 on a 4.0 scale.
>
> Forty-one states require some form of testing prior to certification. In rank order, the concerns for certification are that the applicant be

> proficient in the basic skills (44), professional knowledge (32), subject content (31), and demonstration of competence on the job (14). Of the 46 states testing, 31 use a standardized test. The National Teachers Examination (NTE) and the PPST (26), produced by the Educational Testing Service, are by far the most common. Sixteen use customized tests usually developed within the state, although a few states reported contracts with National Evaluation Systems (NES) to develop state tests. Eight states use both a national standardized test and a customized test. Six states either did not report the tests used or have not yet selected them.

According to a survey conducted by the Educational Testing Service, 11 states have implemented (or are in the process of implementing) a performance assessment program for beginning teachers (Goertz, 1986). The novices must pass the performance test before they are granted regular certification. In these states, teachers generally receive provisional certification when they complete their teacher preparation programs and meet other state requirements. They are formally assessed on their teaching performance during their first year in the classroom as full-time teachers. The beginning teacher programs in the 11 states are in various stages of development; three additional states are planning to implement performance assessment programs.

The utility of standardized tests to assess the competence of beginning teachers has been recognized by the Minnesota Higher Education Coordinating Board. The board's report, "State Policies for Teacher Education," noted that:

> Testing, similar to admissions screening, is seen as a means to eliminate extremely poor teachers from entering the classroom. In addition, screening upon admissions and graduation both are viewed as methods for improving public confidence, and therefore esteem, in the teaching profession. Testing is a politically popular symbol that the state insists on high standards for its teachers. . . . Upgrading the image of the profession may help in recruiting high ability applicants and help in winning public support to pay for them.
>
> Unlike admissions screening, licensure tests also are promoted as a stimulus to improve the content and rigor of teacher education programs. The tests provide an independent check on the quality of teacher education graduates on the grounds that the programs themselves cannot be relied upon to uphold sufficiently high standards. Passing scores on the tests serve as a visible measure of overall program effectiveness. Programs with poor records receive outside evidence that improvements may be needed. Prospective students are warned that these programs should be considered carefully.

At the same time, the board recognized that the content and nature of teacher testing must be carefully considered, to avoid potentially

dysfunctional consequences for the content of teacher education and the composition of the teaching force. These concerns were prominent in the state's decision not to adopt a multiple-choice paper-and-pencil test of professional knowledge of the sort currently available, and to seek instead more valid measures of teaching skill.

III. DILEMMAS OF PROFESSIONAL TESTING

The professional examination is an important tool in the licensing process. The principal purpose of the professional examination is to determine objectively if the prospective practitioner has an adequate understanding of basic concepts and the ability to apply those concepts to practical tasks. The professional examination is used to screen out those not able to exhibit this knowledge and ability. A rigorous examination with appropriate passing standards ensures that members of the profession have at least a minimum level of knowledge and, thus, begins to establish public trust. Public trust is an essential element of professionalism, since members of a profession must be able to operate autonomously in applying knowledge to the specific needs of their clients. In exchange for professional autonomy and control, the profession assures the public that it will not be harmed by the practice of a licensed professional.

In concept, the idea of requiring a test to engender public confidence seems straightforward and simple. However, there are many dilemmas posed by this decision. What knowledge is worth testing? How can the ability to apply many diverse kinds of knowledge to complex situations be assessed? How can the overall assessment be designed to produce fair, reliable, and valid measurements? If these questions are not appropriately resolved, the examination may undermine the development of a profession's knowledge base rather than strengthening it. It may sort candidates unreliably or on the basis of invalid criteria, thus undermining faith in the outcomes of the licensure process.

Other professions have addressed these dilemmas in several ways. (See Appendix A for a review of licensure procedures in four other professions.) First, they have created professional bodies to oversee the development, administration, and scoring of their examinations. These boards devote considerable energy to articulating and continually refining the statement of the professional knowledge base represented in the examinations. Second, they have created examinations that are designed to test discrimination, judgment, and reasoning as well as knowledge of facts. The examinations allow demonstrations of ability to apply knowledge through extended case scenarios, exhibitions of task performance, and competence in essay responses or oral examinations. Finally, professions like medicine, architecture, and engineering have staged the licensure process to include, before the final examination, a structured internship or apprenticeship experience. This

experience provides a more extended and valid assessment of performance on specified criteria, while improving the candidate's chances of acquiring the applied knowledge needed to pass the final stage of the examination.

None of these features of professional licensure yet apply to teacher testing procedures. The expectation that teacher testing will improve the overall quality of the teaching force by either eliminating incompetence or encouraging changes in teacher education rests on an assumption that the tests are good measures of teacher qualities related to effective teaching. For existing tests, available evidence is not convincing.

PAPER-AND-PENCIL TESTS

By far the most widely used teacher competency tests are the National Teacher Examinations (NTE). A number of studies of the validity of the National Teacher Examinations have been conducted with consistent results. Studies of the concurrent validity of the test—how well it correlates with other measures of academic ability or knowledge—find fairly strong relationships between NTE scores and scores on other tests such as the Graduate Record Examinations (Pitcher, 1962; Quirk et al., 1973; Ayers and Qualls, 1979). More modest but still significant relationships are found between NTE performance and undergraduate course preparation or grade point average (Willson and Stoller, 1981; Quirk et al., 1973; Merritt, 1980; Andrews et al., 1980; Ayers and Qualls, 1979). However, consistent relationships between teacher test scores and later performance have not been found (Summers and Wolfe, 1975; Ayers and Qualls, 1979; Andrews et al., 1980; Quirk et al., 1973).

Few studies of the predictive validity of state-developed tests have yet been conducted. A study that examined the relationship between beginning teachers' scores on the Georgia teacher certification tests of subject matter knowledge and ratings of on-the-job performance (using Georgia's Teacher Performance Assessment Instrument) found generally small and insignificant correlations, both positive and negative, depending on the subject area (SREB, 1982).

Studies of the NTE or of other state-developed tests are conducted to set cutoff scores, and they have not attempted to discern any connection between candidates' test scores and their later teaching performance or student outcomes. Instead, the approach used by test developers in conducting the studies is to ask education program faculty members (and, in some cases, practitioners) to make judgments

about the relationship between test content categories and the teacher education (or general education) curriculum and to make estimates of the proportions of "minimally knowledgeable candidates" who would be expected to know the answers to certain categories of test questions. Educators are also often asked to judge whether students would have had the opportunity to acquire the knowledge represented by the questions and to assess the job relatedness of content categories, an important factor in the legal defense of tests that may have discriminatory outcomes.

Generally, the results of such validation studies are not used to alter the content of the tests but, instead, to set cutoff scores for passing the test. Thus, test items in which educators have little confidence remain on the tests, even after "validation" has been accomplished. Equally important, this approach to test construction and validation does not produce a coherent statement of what teachers should know and be able to do. This failure then provides no guidance either for professional education or teaching practice.

Of particular concern are currently available tests of pedagogical knowledge, such as the NTE Professional Knowledge examination and components of subject area tests that deal with pedagogical approaches. Critics, including some who endorse basic skills and subject matter testing, are concerned that existing pedagogical examinations present a narrow ideological view of good teaching while oversimplifying the nature of teacher decisionmaking (see, e.g., Andrews, 1984; Soar et al., 1983; Palladino, 1980). Because the tests rely solely on multiple-choice responses to brief statements of professional problems, they fail to represent the complexity of the decisionmaking process or the full range of the professional knowledge base. The problem of adequately representing a complex knowledge base in a manner that allows assessment of skill in applying that knowledge intelligently is twofold: (1) Both the generalizability and limitations of particular "rules of practice" must be acknowledged; and (2) the reasoning process for applying knowledge must be assessed. Unless professional examinations can achieve these goals, they will not adequately serve the interests of the profession and the public.

In contrast to current approaches to teacher testing, testing in other professions goes beyond multiple-choice paper-and-pencil tests of basic information. Doctors are interviewed (and sometimes observed) by a panel of their peers about past and hypothetical treatment decisions in specific cases; lawyers must apply their knowledge and legal reasoning skills in case analyses; architects must demonstrate their ability to design structures; accountants must solve problems of accounting practice. Here the emphasis is not just on "right answers" but on the

candidate's ability to apply knowledge and judgment in professionally acceptable ways. This emphasis is necessary because these professions recognize the indeterminacy of professional knowledge and the need for judgment in applying such knowledge in varying situations. Where multiple-choice tests are used, they often present elaborate case scenarios with relevant data, so that candidates can evaluate the context within which to apply their knowledge. (See Appendix A for a fuller description of examinations in other professions.)

As is true in other professions, ethics, best practices, and the handling of specific classroom problems are often highly context-specific. Effective teaching behaviors have been found to vary for students of different socioeconomic, mental, and psychological characteristics (Brophy and Evertson, 1974, 1977; Cronbach and Snow, 1977; Peterson, 1976) and for different grade levels and subject areas (Gage, 1978; McDonald and Elias, 1976). Some teaching behaviors that are effective when used in moderation can produce significant and negative results when used too frequently or when applied in the wrong circumstances (McDonald and Elias, 1976; Coker et al., 1980). These kinds of findings make it difficult to develop rules for teaching behaviors that can be generally applied or easily tested with simple statements intended to engender simplistic responses. As Brophy and Evertson (1976) observe:

> Effective teaching requires the ability to implement a very large number of diagnostic, instructional, managerial, and therapeutic skills, tailoring behavior in specific contexts and situations to the specific needs of the moment. Effective teachers not only must be able to do a large number of things; they also must be able to recognize which of the many things they know how to do applies at a given moment and be able to follow through by performing the behavior effectively.

Multiple-choice responses to briefly stated questions about teaching strategies or behavior are difficult to defend when, in many cases, a thoughtful respondent would have to answer "It depends." Pugach and Raths (1983) warn of such tests:

> A primary problem with tests of this nature is that they tend to represent particular ideologies, namely, those of the item writers. . . . If such an examination were to be required on a statewide basis, schools, colleges, and departments of education would need to prepare their students for the test, a process that is likely to narrow the range of philosophies found in the teacher education classroom. At a time when it is increasingly recognized that a repertoire of approaches and the ability to draw on them in a variety of classroom situations is a desirable characteristic of teachers, any move that would narrow their study seems problematic.

An example from the NTE sample booklet (ETS, 1984) is indicative of the problem:

> Research indicates that in classrooms where effective teaching and learning occur, the teacher is likely to be doing which of the following consistently?
>
> (a) Gearing instruction to the typical student at a given grade level
>
> (b) Carefully grouping students at the beginning of the school year and making sure that these groups remain the same throughout the year
>
> (c) Identifying the effective behaviors that students are likely to exhibit at a given level of development
>
> (d) Working diligently with students to make sure that each learns all of the material planned for the class for the year or
>
> (e) Pacing instruction so that students can move ahead when they are able to or receive extra help when they need it.

The designated right answer, "E," has merit. However, some research on teaching effectiveness has concluded that whole group instruction at a common pace is more likely to foster time-on-task and increased scores on achievement tests. And much research on individualized instruction—the kind of approach suggested by response (e)—has failed to find that it produces significant learning gains. There are many intervening variables concerning classroom organization, teaching behaviors, and instructional goals that make the simplistic application of any research suspect. The point is that, in this case, as in many others where oversimplification is sought, selecting the right answer is more a matter of agreement with the test's philosophy than knowledge of research.

Questions that rely on a simplistic view of teaching are not only inadequate to assess what skilled and knowledgeable teachers know, they encourage a soft-headed approach to the preparation of teachers. In the area of educational research, consider the following question:

> In general, which of the following factors has been shown in several studies to have the strongest relationship to variation in student achievement?
>
> (a) Teacher experience
>
> (b) School size
>
> (c) Type of textbooks
>
> (d) Student/teacher ratio, or
>
> (e) Community's average income.

Without citing the "several studies" referenced, the question is meaningless. Many studies could be marshalled to support any one of the responses. Furthermore, the desired answer "e" is badly flawed, since most studies finding effects of income on achievement use measures of student family income, not community income.

Finally, by choosing among several defensible answers, the one that emphasizes a factor over which educators have no control, the test conveys a philosophy about what teachers might expect from students, and from themselves.

It is not necessary to question whether the "right" answer is right, only to note that this test, like many others, conveys a point of view about teaching. When a test prefers one body of opinion or research over another, teacher candidates must have the opportunity to express and defend alternative viewpoints that may be equally valid in given teaching circumstances. The real issue here is that most of the knowledge and judgment involved in successful teaching cannot be reduced to a simple answer to a brief question on a multiple-choice test. Take, for example, a question intended to assess instructional knowledge:

> Use of which of the following is most important in the beginning instruction of the young, visually impaired child?
>
> (a) Machines with lighted screens to magnify print
>
> (b) A variety of large-print books
>
> (c) Extended periods of nondirected play
>
> (d) Many tactile and oral activities, or
>
> (e) Large-print flash cards for learning sight vocabulary.

Since the question does not reveal how young the child is or how severe the visual impairment, the desired answer (d) is a safe guess, but it is not necessarily the course of action that would be appropriate for, say, teaching reading to a seven-year-old child who is at least partially sighted. Even a "correct" answer to the question does not reveal whether a teacher could design an appropriate learning experience for the child.

These questions stand in sharp contrast to those that appear on other professional examinations, even those that are in a multiple-choice format. Questions that seek to ascertain whether a candidate can apply knowledge to a specific problem of practice generally describe the client or problem in considerable detail, representing important factors that are necessary for decisionmaking, and frequently

requiring multiple answers about various features of the case (see Appendix A).

Teaching knowledge cannot generally be encapsulated into uniform, generally applicable prescriptions for practice. Hence, tests that seek to measure teaching knowledge without reference to the contextual factors that must guide teaching decisions fail to adequately capture the essence of pedagogy and threaten to undermine effective teacher preparation. The challenge is to develop assessments of teaching knowledge that are not only reliable but also valid; that not only sort candidates by cutoff scores but also represent essential teaching knowledge and skills. Until tests are seen as valid, neither the profession nor the public will consider them as credible evidence of competence.

PERFORMANCE ASSESSMENT

In part because existing paper-and-pencil tests do not adequately capture relevant teaching knowledge or the capacity to apply that knowledge, some states have added on-the-job performance assessments to their other testing requirements. In these states, beginning teachers are granted an initial license to teach when they have satisfied educational and other licensure requirements; after they have secured a teaching job, they must pass a performance evaluation before being granted a continuing license. Generally, this involves several observations of classroom performance by two or three evaluators who rate the teacher on the basis of whether specified teaching behaviors are present or absent. (Appendix B presents a brief description of beginning teacher assessment programs in the 11 states where they are currently used.)

This approach to performance assessment suffers from three major shortcomings: (1) The rating instruments seek to promise objectivity by specifying a set of uniform teaching behaviors that can presumably be tallied to measure competence in a small number of classroom observations; (2) the assessment systems do not evaluate candidates in similar job settings and performance situations, thereby failing to guarantee reliable assessment across candidates and compromising the fairness of licensing decisions; and (3) licensing assessments are made in part by employers who are also responsible for hiring and the granting of tenure, thereby entangling licensing and employment decisions.

The state-mandated rating instruments used in these types of performance assessments generally rely on two assumptions about the nature of effective teaching and the measurement of teacher

competence. First, they assume that there is a set of discrete teaching behaviors that can be observed on a few occasions in diverse classroom settings and that are equally effective for all grade levels, subject areas, and students. Second, they assume that measurement of these behaviors can be accomplished by tallying the number of times a particular teaching action occurs.

Efforts to link specific teaching behaviors to student outcomes have often sought context-free generalizations about what leads to or constitutes effective teaching. Although this research strongly suggests that what teachers do in the classroom does affect students, claims that discrete sets of behaviors consistently lead to increased student performance (e.g., Medley, 1979; Stallings, 1977) have been countered by inconsistent and often contradictory findings that undermine faith in the outcomes of simple process-product research (e.g., Doyle, 1978; Dunkin and Biddle, 1974; Shavelson and Dempsey-Atwood, 1976). The most extensive process-product study of teacher effectiveness, the Beginning Teacher Evaluation Study, contributed to the discomforts associated with linking teacher behaviors to student learning. After that monumental effort, "the researchers . . . concluded that linking precise and specific teacher behavior to precise and specific learning of pupils (the original goal of the inquiry) is not possible at this time. . . . These findings suggest that the legal requirement for a license probably cannot be well stated in precise behavioral terms" (Bush, 1979, p. 15; see also McDonald and Elias, 1976).

At best, the teaching performances advanced as having consistently positive effects on student achievement are relatively broad constructs rather than discrete, specific actions of teachers. The Beginning Teacher Evaluation Study found little evidence that single teaching performance variables can be identified as essential for effective teaching; rather, it found that differences in *patterns* of teaching performances contribute to learning. However, even these broader patterns are not uniformly applicable to all grade levels, subject areas, and teaching situations (McDonald and Elias, 1976). Similarly, the variables identified, such as clarity, variability, enthusiasm, use of student ideas, probing, types of questions, use of structuring comments, and academic learning time ("time-on-task") as consistently related to student achievement (Rosenshine and Furst, 1971) are best characterized as high-inference variables; that is, they do not readily break down into easily tabulated, discrete teaching actions.

The effort to reduce teaching to specific behaviors that can be tabulated is intended to ensure "objective" (that is, nonjudgmental) assessment. This approach, however, leaves no room for judgments of appropriateness, or for the possibility that a given action may be effective in some situations but counterproductive in others.

In the Florida model, for example, the observer is required to record teacher behaviors in one of two columns. In the past, the first column was headed "effective indicators" and the second "ineffective indicators." For example, "begins instruction promptly" was an effective indicator and its counterpart, "delays," was an ineffective indicator. Although the 1985 edition of the Summative Observation Instrument (SOI) leaves the left and right columns unnamed, the manual gives the following instructions for tallying observations:

1. Begins instruction promptly/delays

   (a) Tally in the left column if the teacher: organizes and begins work promptly after the bell rings works with the class as a whole and manages interaction so that time is used productively.

   (b) Tally in the right column if the teacher does one or more of the following: does not routinize and handle with dispatch such things as roll reports and lunch tickets chats with students so that classwork is delayed loses time while students go to their lockers for supplies.

The manual instructs the observer to summarize the data at the end of the observation period by counting the tallies in each column:

> To complete the data collection process the marks are summed after the observation period and a frequency count is posted in the observation summary box. The observation is completed and the data are ready for analysis.

MacMillan and Pendlebury (1985), in their assessment of the Florida model, conclude that:

> It should be clear from this summary that the SOI is an evaluative instrument masquerading as an observation instrument. Under the guise of objective (because "noninferential") observation, the SOI provides a loaded summary of what the observer has seen. This is even more obvious when specific notes are given concerning some ineffective indicators. For example, in regard to asking questions that call for personal opinions, nonacademic procedural questions, or questions that call for "general nonacademic information," all to be tallied as ineffective, there is a note: "These questions may sometimes serve useful or even necessary purposes; however, they should be tallied here since they do not move the class work along academically" (p. 75).

The use of these "objective" evaluation instruments only exacerbates the tendency to think of teaching as an unvarying didactic exercise that is unresponsive to the characteristics of students or the nature of learning tasks. The models seek to make evaluation—which is and

must be an intrinsically subjective and judgmental activity—"evaluator-proof" by measuring and quantifying those teaching variables that are easily measurable and quantifiable.

The conversion of teacher-effects research findings to finely drawn rules for teacher behavior is a cornerstone of the state-mandated beginning teacher evaluation models. These models implicitly assume that the rules are generalizable because student outcomes are determined primarily by particular uniform teaching behaviors. By implication, the models assume either that other contextual influences on student outcomes are relatively unimportant or that these other influences do not call for different teaching behaviors for teaching to be effective. However, research on nonteaching variables in the educational environment (Centra and Potter, 1980; Anderson, 1982) indicates that (a) many factors other than teaching behaviors have profound effects on student learning; and (b) effective teaching must be responsive to a number of student, classroom, and school variables in ways that preclude the application of predetermined approaches to teaching (Doyle, 1979).

Research on the stability and generalizability of measures of teaching behavior lends support to a context-specific view of teaching. Stability refers to the extent that a teacher's behavior as measured at one point in time correlates with measures taken at another point in time. Generalizability refers to the extent that such measures are stable across different teaching situations (e.g., different subject areas, grade levels, student ability levels, etc.). The crucial question is: Does a given teacher exhibit the same kinds of behavior at different points in time and within different teaching contexts? In general, the answer is "no," especially with regard to measures of specific, discrete teaching behaviors of the sort that are used in the existing state assessment models (Shavelson and Dempsey-Atwood, 1976).

Teaching acts, such as instructional format, pacing, and choice of activities, tend to vary with elements of the teaching context, such as subject matter, students' stages of development, and instructional goals (Stodolsky, 1984). Thus, the same elementary teacher will use different approaches to the teaching of mathematics and social studies. The same secondary school teacher will use different approaches when teaching the same subject matter to different classes of students. Teaching acts also vary depending on the cognitive level of instructional goals, the curriculum structure, and the stage of development of a unit or course of student (e.g., introduction of concepts, practice in performance, reinforcement, or skill application).

Stodolsky (1984) explains the implications of this variability for assessment procedures that rely on classroom observations:

> Most teacher evaluations rest on a small number of direct observations. The situations to be observed usually are not specified. Such observations, which may carry considerable weight in determining a teacher's future, are unlikely to be fair because any given observation will not be representative of the range of teaching behaviors, skills, and arrangements used by a teacher.

In conclusion, she argues that "an objective, reproducible measurement situation for a *given* observation occasion is necessary but not sufficient to guarantee stable estimates of teacher *behavior* across observation sessions."

There are other limitations to classroom observation as an assessment method. Classroom observations generally reveal little about the coherence of the curriculum, the depth and breadth of content covered, the range of teaching techniques used, the quality and variety of materials employed, the types and frequency of student assignments, the quality of instruments (tests, papers, projects) used for student assessment, the kinds of feedback students receive on their work, or the appropriateness of any of these things for the classroom context. These important elements of teaching cannot be assessed well without other sources of information beyond classroom observation.

The preceding discussion suggests that licensing decisions should not be made on the basis of classroom observations that seek to tally specific discrete behaviors of teachers without reference to the context of instruction. Such observations will not adequately measure overall teaching competence because the behaviors they seek to measure are neither stable nor generalizable, and the method does not allow assessment of many important teaching skills, including teaching decisions that respond to student needs and classroom events. But these technical problems are only one set of reasons why this approach to assessment is inherently invalid for state licensing decisions.

That on-the-job evaluation may be problematical should be suggested by the fact that no profession now evaluates on-the-job performance as the basis for state licensing.[1] Upon reflection, the reasons become clear. Teachers are not licensed to instruct a particular group of children, such as "fifth graders at Kennedy Elementary." Instead, they are licensed to teach children who differ with respect to grade level, general intellectual ability, stages of cognitive development, educational opportunity, socioeconomic status, family attitudes toward education, and many other characteristics. Assessing a candidate's ability to instruct children in one classroom provides little information about whether that candidate is likely to be effective in teaching

[1]However, successful completion of an internship or a period of on-the-job performance may be a prerequisite for taking the licensing examination.

children with very different characteristics and educational needs. Furthermore, how well a teacher performs on the job is a function not only of his or her knowledge, skills, and dispositions but also of the teaching environment. It is, in principle, unfair to assess a teacher's performance without taking these factors into account. Otherwise, random factors will determine how well a person appears to perform.

The district's curriculum guide may or may not be sound; it may or may not be appropriate for the entire class; it may or may not be appropriate for individuals in the class. Curriculum materials may or may not be of good quality. Other teaching resources may or may not be available. The school or the principal may or may not have established a good environment for learning. And so on. Candidates assessed in different settings will not have equivalent opportunities to exhibit their skills. And there is no proven systematic method for taking these factors into account. Therefore, on-the-job assessment is inherently inappropriate for licensing decisions for it cannot reach an acceptable level of reliability and validity.

Nonetheless, the appearance of reliable assessment is important, because the procedure is to be used as the basis for state licensing decisions. This concern has been addressed by using standardized "objective" rating systems for evaluation, even though the settings, educational contexts, and actual tasks observed in assessment differ substantially from one candidate to the next. Thus, efforts to ensure interrater reliability by reducing variability produced by differing judgments have failed to address the fundamental problems of test reliability across candidates and tasks. The need to assure ostensible reliability across candidates, evaluators, and districts has resulted in instruments that count teacher behaviors but do not allow for assessment of the appropriateness of teaching decisions or actions. The price paid for the emphasis on "objectivity" as a means for obtaining interrater reliability is a process with low generalizability and extremely limited validity. High scorers do not necessarily possess better teaching skills than low scorers. Thus, the approach is inherently flawed and fails to achieve what it sets out to achieve—the identification of incompetent teachers.

Evaluating performance in a single job context is inherently invalid for licensure decisions. Evaluating performance by occasional observation is invalid. Additional problems are created by the use of school district personnel as evaluators of already-hired beginning teachers. These administrators are simultaneously responsible for hiring, tenure, and licensing decisions; thus, *employment* criteria and *licensure* criteria

are inextricably entangled. Though they are trained by the state and obliged to follow state guidelines, the primary loyalty of these administrators is to their school district. The result is potential conflict of interest in the enforcement of state standards. If school districts experience a shortage of teachers, pressure will exist to see that candidates pass. Furthermore, districts are placed in some legal jeopardy if they make contradictory decisions about the continued employment and licensure of a new employee. Ultimately, the variable employment standards of local school districts are likely to determine the outcomes of the licensure process. A state agency—independent of employment pressures—must be charged with maintaining standards. That agency cannot delegate this responsibility to an employer. To do so would be like allowing an individual law firm to admit lawyers to the bar—it allows local employment decisions to substitute for state licensing decisions.

TEACHER PREPARATION AND TEACHING PRACTICE

The importance of establishing and enforcing standards for entry to teaching is self-evident even if not always accomplished. But standards do much more than determine who will and who will not teach. Standards define the nature of teaching desired and define the effective teacher. Professional examinations define the knowledge and skills required of practicing professionals and are the means by which professions make an explicit statement about what is worth knowing and how it should be known and demonstrated. This statement exerts a powerful influence on both training and practice, independent of cut-off scores or passing rates.

Standards, then, focus attention in two directions. They reflect backward to teacher preparation and forward to teaching practice. However, standards are generally not operational statements. They must be translated into preparation programs, on the one hand, and into testing requirements, on the other hand. These translation activities are critical. Frequently in education it is at this stage that problems begin. Excellent statements of standards can be trivialized when goals become narrowly framed "learning objectives" in curriculum guides, or when standards for good teaching are reduced to "observable behaviors" on evaluation instruments. Although there is nationwide interest in testing teachers for entry to teaching, there has not been a corresponding level of interest in the process of translating standards into effective teacher preparation programs and into testing programs that measure what they should measure. Nowhere is the failure more

evident than in the evaluation of the teaching skills of beginning teachers.

The challenges of creating a valid and reliable assessment system for licensing beginning teachers are many, particularly when the goal is to ensure that licensed teachers not only have a grasp of the subject matter they will teach but also the knowledge and skill required to teach effectively. The assessment must reliably measure:

- Possession of the essential knowledge that underlies good teaching;
- Ability to apply that knowledge appropriately in different contexts;
- Skill in performing diverse teaching tasks in ways that are responsive to students' understandings and abilities and that are practicable in the classroom setting.

As we have seen, existing instruments and methods for assessing teaching knowledge and skill are unable to fully capture the complexities of teaching knowledge and the context-dependent nature of teaching judgment. This failure is largely due to the kinds of assessment instruments used. However, because the acquisition of teaching skill is so dependent on developing judgment in complex, nonroutine situations, it cannot be adequately assessed until after the prospective teacher has had an opportunity to encounter and work through many of the common problems of teaching practice.

Before new teachers are granted a continuing license, the evaluation process should identify whether or not the novice possesses teaching skills. However, meaningful evaluation must provide an assessment of teaching that reveals not only whether a teacher does specific things at discrete points in time (for example, whether a teacher has lesson plans, behavioral objectives, and an orderly classroom during the occasional class periods when the evaluator appears), but whether a teacher has sufficient knowledge, skill, and judgment to make sound teaching decisions over a sustained period of time on behalf of many students with diverse needs.

The kinds of skills that the state would like to be sure that licensed teachers possess cannot be acquired through university-based teacher education alone. Neither can they be efficiently acquired by trial and error during the initial years of practice. If a major goal of licensure is to increase the probability that those admitted to practice can indeed make appropriate decisions and teach effectively, the licensure decision should require both the opportunity to learn these skills and evidence that they have been learned.

Other professions, such as medicine and architecture, have accommodated similar concerns for the development of skill in practice by requiring a form of structured internship before licensure (see Appendix A). This serves simultaneously as a training vehicle, a safeguard for the public, and a source of support and assistance to beginning practitioners. The internship programs differ from current student teaching and beginning teacher programs in at least two ways:

1. They provide for graduated assumption of responsibility for client service.
2. They require that all interns experience particular types of situations for decisionmaking and practice under supervision.

The internship experience extends professional training in a clinical setting without exposing clients to unsupervised novices or leaving to chance the acquisition of essential skills. Not incidentally, these types of programs are more oriented to assistance than assessment, to enhancing effectiveness rather than screening and sorting. These latter functions are left largely to the licensure examination, thus disentangling the formative and summative aspects of the evaluation process.

Formal *teacher induction*—planned assistance to and assessment of beginning teachers—has rarely existed. Yarger (1982), in his review of the research, noted several reasons for the lack of teacher induction programs: (1) Institutional responsibility for such programs is lacking, (2) the public response to assessing the teaching skills of beginning teachers is embedded within competency tests rather than extended training programs, (3) the political power struggle in teacher education precludes the luxury of induction program development, and (4) logistical considerations and the lack of financial resources are impediments under current schemes for financing teacher education and school systems.

Thus, in most cases, beginning teachers—with no more assistance from their college professors and few school district resources allocated for formal support—are left to "sink or swim" during their first year of teaching. This lack of support is exacerbated by common school district teacher placement policies. For example, many school districts tend to place beginning teachers in the most difficult assignments.[2] As McLaughlin et al. (1986) have noted:

[2]Beginning physicians also get some of the least desirable assignments but these first assignments are supervised by experienced practitioners.

> New teachers are often given those students or courses with which experienced teachers do not wish to deal. Instead of giving beginning teachers a nurturing environment in which to grow, we throw them into a war zone where both the demands and the mortality rate are excessively high. It is really not surprising that almost one-third of teachers leave the profession within their first five years of teaching.

The placement of beginning teachers in the most difficult assignments is encouraged by district internal transfer policies which allow senior teachers to move to a school of their choice. When a vacancy arises in a more desirable school, senior teachers tend to transfer away from the more difficult schools. Consequently, the more difficult schools are more likely to be staffed with more new and inexperienced teachers. These schools are also less likely to maintain an adequate cadre of experienced teachers who can assist new teachers. Thus, beginning teachers presented with the most difficult educational problems and with little opportunity for assistance are likely to experience frustration and fail to develop a sense of efficacy in their initial teaching experience. As a result, they experience high attrition rates. Not incidentally, the students of these neophytes are subjected to instruction by a person who is learning—or not learning—how to teach (Wise et al., 1987).

Research on the experiences of beginning teachers confirms that the likelihood of long-term success is substantially impaired by the absence of expert guidance, support, and opportunities to reflect on their efforts (McDonald, 1980). These initial teaching experiences have far-reaching effects, for "the conditions under which a person carries out the first year of teaching have a strong influence on the level of effectiveness which that teacher is able to achieve and sustain over the years, on the attitudes which govern teacher behavior over even a forty-year career, and indeed, on the decision whether or not to continue in the teaching profession" (National Institute of Education, 1979).

Most beginning teacher programs do not substantially improve the conditions under which new teachers teach. As Borko (1986) notes:

> Most state-mandated (beginning teacher) programs require that beginning teachers demonstrate competence in a standardized set of teaching behaviors in order to receive certification. Assistance is often viewed as remediation and limited to observed deficiencies in the generic teaching competencies assessed within the program. Because certification criteria must be consistent across the state, most programs are not context-responsive. Moreover, the primary function of state programs is gatekeeping or screening. Thus, competing concerns for individual teachers' professional growth on the one hand, and for establishing a defensible data base to support a recommendation against certification on the other, often shape the nature of assistance.

Fox and Singletary (1986) observe that few beginning teacher programs focus upon providing the novice with the necessary assistance required to ease the critical transition from student to teacher. The authors point out that "few (programs) focus on the goals of developing a reflective orientation and the skills essential to self-evaluation." Without these, beginning teachers are likely to be frustrated and unable to cope with the demands placed upon them. In fact, the authors have concluded that beginning teacher evaluation programs devoid of structured assistance will increase pressure on new teachers.

If teaching is to attract and retain talented recruits, prepare them to practice competently, and ensure the public that licensed teachers can be trusted to employ professional standards of practice, a supervised induction process is as necessary to the licensure process as are carefully formulated examinations of teaching skills and knowledge. In subsequent sections of this report, we describe proposed standards for licensure and conditions for training that have the potential to upgrade both the quality of teachers and the quality of teaching.

IV. A PROFESSIONAL LICENSING SYSTEM FOR TEACHERS

The Task Force on Teacher Education for Minnesota's Future has developed a set of standards to guide teacher education programs. These same standards provide indicators of what the licensing system should seek to assess and suggest how training opportunities should be structured.

THE EFFECTIVE TEACHER

Minnesota wants teachers who know the subjects they teach, have the professional and pedagogical knowledge to teach, and have demonstrated that they can teach. According to the task force, "teachers should be thinking, creative persons who use a set of principles and strategies derived from an informed personal philosophy of education and the multiple demands of learning contexts." Just as professionals in all fields, teachers must acquire knowledge, skills, and dispositions and be prepared to apply these in the service of particular clientele. The task force organized the desired attributes of teachers into three broad categories.

The first relate to the *dispositions* that beginning teachers should have. Examples include:

- Teachers should reflect on their own teaching and its effects on learners.
- Teachers should recognize and use learner readiness and motivation.
- Teachers should use a variety of teaching strategies derived from research.
- Teachers should engage in professional responsibilities within the building, the district, professional organizations, and the community.

The dispositions toward self, the learner, and teaching convey the idea that analysis is integral to effective teaching. The disposition toward responsibilities beyond the classroom conveys the idea that teachers must help to shape the policies under which they operate.

Second, teachers must have a set of teaching *skills* that include the ability to make the "complex," "elaborate," and "multiple" decisions

necessary to effectuate learning. Examples include:

- Teachers must have superior communication, critical decision-making, and problem-solving skills.
- Teachers must be able to analyze and interpret both objective and subjective information about students' learning characteristics, attitudes, and backgrounds.
- Teachers must make judgments and decisions about what students have learned, should learn, and are learning.
- Teachers must balance learning objectives, student characteristics, teaching strategies, and curriculum objectives.
- Teachers must monitor and evaluate student learning through a variety of methods.
- Teachers must manage the learning environment to promote desired social development.

These intellectual, assessment, planning, instructional, evaluation, management, and role-modeling "skills" constitute the basis for effective teaching. Although they are termed "skills," these complex behaviors and mental processes are the product of a teacher's background and education as applied in specific learning contexts. They are not always, or even usually, performance skills that can be observed simply by watching a teacher teach.

Third, according to the task force, teachers must have *knowledge*. They must have knowledge about such questions as:

- Within disciplines, how do different theories and methods of inquiry determine what is known?
- What is the relationship between the structure of a discipline and the way it should be taught?
- How does human development determine learning and learning determine development?
- How do communication strategies and styles affect learning?
- How should the scientific method affect teaching?
- How should educational research findings affect teaching strategies?
- How do organizations influence people and people influence organizations?
- How does culture affect teaching and teaching affect culture?

Effective teaching requires knowledge about people, culture, epistemology, specific disciplines, human growth and development, communication and language, scientific inquiry, and effective learning and teaching. Possession of that knowledge does not, of course, by itself

translate into effective teaching. Effective teaching requires not only breadth of knowledge but also the ability to apply knowledge appropriately and the disposition to teach. The effective teacher is a professional—liberally educated, prepared to teach, and, thus, equipped to make appropriate instructional decisions on behalf of particular students and classes.

LIBERAL EDUCATION AND AN ACADEMIC MAJOR

There is a growing consensus that teachers should be liberally educated and that they should have a major in the subject that they will teach (National Commission for Excellence in Teacher Education, 1985). Such groups as the Holmes Group and the Carnegie Task Force have argued that this dual objective demands that prospective teachers be college graduates before they pursue specific teacher preparation. Since teachers are the transmitters of our cultural and scientific heritage, they should be—and should be seen as—liberally educated persons. Furthermore, if they are to be seen as being well-educated in their teaching field, they should know as much about the subject they will teach as anyone else who majors in that subject in college. There is growing doubt that this dual objective can be achieved within the context of an undergraduate program that also includes specific preparation for teaching.

Minnesota has already settled the issue of testing for the outcomes of a liberal arts education. The legislature has mandated that prospective teachers be required to pass a test of reading, writing, and mathematics and a test of academic knowledge needed to teach in the field of licensure. Although the purposes of a liberal arts education are broader than the objectives implicit in these two tests, there is merit in avoiding more comprehensive testing. The goals of liberal education are extensive and varied—so much so that no prospective teacher could pursue them all. Since all the goals of liberal education are of value in teaching, no point would be served by trying to establish a narrow list of goals for prospective teachers.

TEACHER EDUCATION

Prospective teachers have long been expected to know about the historical, economic, social, and political context of schooling. There is a growing consensus that they should know this context so that they can operate more professionally by helping to shape the environment within which they work. Prospective teachers have long been expected

to know about human development, the psychology of learning, and pedagogy. There is an emerging consensus that this knowledge base is maturing and becoming more practical. Although this knowledge can be incorporated into the undergraduate curriculum, doing so requires substantial tradeoffs between education and other liberal arts coursework. Consequently, the leading edge of opinion is that teacher education should not be attempted within a four-year undergraduate curriculum and should be accomplished at the graduate level. There are, of course, obstacles to be overcome in making such a change.[1] Colleges and universities would, in many cases, have to shift their programmatic focus to the graduate level. Some universities already offer teacher preparation at this level. Candidates would need to undergo an extra year of education; the commitment of time and money could decrease the pool of applicants. However, most current teachers already have a master's degree, and many were trained in graduate programs of education. The profession is already moving in this direction, and some states are encouraging this change. Although full implementation of this type of proposal would take time and financial support, as it did in other professions, the long-range outcome would be a larger supply of well-trained candidates as the profession gains stature.

Should the outcomes of teacher education (whether at the undergraduate or graduate level) be tested as a condition for initial licensure? This question has been decided differently in different states. The acquisition of professional and pedagogical knowledge is important. It equips the candidate with the intellectual underpinnings of the profession. However, possession of this knowledge by itself does not indicate that a teacher can teach. This theoretical knowledge must ultimately be converted to practical knowledge through a supervised experience. For this reason, there are reasons to believe that testing of the candidate's professional and pedagogical knowledge should be done in conjunction with the evaluation of his or her teaching skills following an internship year. This is the approach taken in professions like engineering, accounting, and architecture, which test applied knowledge after a supervised induction experience. In this context, quality control over the university-based teacher education phase would operate in the traditional manner. Teacher education programs would continue to be approved by the Board of Teaching, and candidates would pass degree requirements to be graduated. It is the responsibility of the teacher education program to prepare the prospective teacher for the internship. And it is the responsibility of the accrediting organization to ensure that this occurs.

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[1]The problems of shifting from a four- to a five-year program are analyzed in National Commission for Excellence in Teacher Education (1985), especially pp. 14–15.

Although a test of professional and pedagogical knowledge following teacher education could be considered, several practical factors currently argue against it. First, no tests that treat teaching as a profession requiring skill and judgment now exist. Second, the most useful test of a candidate's professional and pedagogical knowledge is one that requires the candidate to apply that knowledge. The ability to apply knowledge cannot be fully developed in a didactic setting. The testing of judgment must wait until the candidate has had supervised experience in applying knowledge in practical settings. In other words, skill in the application of knowledge must be developed before it can be tested. Third, if a test of professional and pedagogical knowledge is too tightly coupled to the professional school curriculum, it may deflect from the central objective of preparing candidates to teach. Fourth, the tests already mandated by the legislature and the test of teaching skills to be proposed will already place significant burdens on both the state and candidates. The state should reserve its developmental efforts and resources for the internship and test of teaching skills. When these are in place, the state may wish to revisit the idea of a test of professional and pedagogical knowledge.

THE INTERNSHIP

An internship[2] should be an integral component in the continuum of teacher education and a prerequisite for licensure. As in other professions, a teacher must have an opportunity to learn to put theory into practice, to learn those aspects of the job that cannot be taught in the professional school classroom, and to practice complex decisionmaking under the supervision of experienced practitioners. In teacher education, students gain knowledge of the sciences basic to teaching and of the methods of teaching; in the internship, they learn to apply that knowledge to teaching situations. Skills in managing the learning process are developed by working with students and by selecting learning materials, assessment tools, and teaching strategies under the guidance of expert practitioners. Prospective teachers learn to use data about student understandings and progress to arrive at diagnostic hypotheses and make teaching decisions. These skills are learned through observation and practice guided by direct supervision, counseling, reviews of practice, and formal instruction.

[2]The concept and organization of the internship program described here rely heavily on those developed in the professions of medicine, psychology, and architecture. In particular, many of the structural features of a teaching internship are adapted from standards described in AMA (1986).

During the internship, the knowledge and skills acquired in teacher education are expanded through the progressive assumption of personal responsibility for student learning in supervised educational environments. As interns progressively gain more knowledge and skill, they are provided greater latitude to make decisions and teach students, but always under supervision.

To achieve its goals, the internship must be carefully structured to provide supervised clinical experiences that cover all of the major domains of teaching practice and that provide opportunities to learn about variability in student learning styles and stages of cognitive development. These clinical experiences, supplemented by instruction and counseling, should help interns to reflect on their teaching, acquire wider repertoires of teaching strategies, and relate problems of teaching practice to research. In preparation for professional practice, the internship should also provide opportunities for interns to participate in institutional and departmental decisionmaking and reviews of policy and practice.

The Role of the Internship in Licensure

The internship year cannot be undertaken until a candidate has completed all of the other requirements for state licensure, including graduation from an accredited program of teacher education and passage of the state tests of reading, writing, and mathematical skills and subject-matter knowledge in the field for which licensing will be sought. This qualifies the candidate to receive an entrance license and to accept employment as a teacher in the State of Minnesota. A continuing license is not granted until the candidate has also passed an assessment of teaching skills. To sit for the state examination of teaching skills, the candidate must complete an internship in a school district that has an internship program accredited by the Board of Teaching.

Although interns receive compensation for the teaching services they provide to the school district in which they pursue their internship program, they are not considered regular members of the teaching staff. The designation of successful program completion is the responsibility of the director of the intern program on the advice of the program faculty.

Requirements for an Internship Program

An internship program must provide an educational experience of sufficient quality to assure that its graduates will possess sound clinical judgment, a high order of knowledge about the evaluation of student needs, appropriate teaching strategies for meeting the needs of students and the demands of the discipline, and the means by which a sound learning environment can be developed and sustained. Although interns cannot be expected to achieve the highest possible degree of expertise in these areas, they must be competent to render effective professional service to students. Furthermore, they must be aware of their own strengths and limitations and of the necessity for continuing their own professional development.

A program must have an explicit curriculum composed of (1) formal instructional experiences, such as regularly scheduled lectures, seminars, clinical conferences, observations of other teachers, and required reading assignments; and (2) clinical experiences in which the intern, under supervision, assumes progressively greater responsibility for student learning. The clinical responsibility must never be greater than that which is optimal for educational purposes. The educational program must include systematic instruction and clinical experiences in all of the major domains of teaching knowledge and skill. The outcomes of this program should be defined by the Board of Teaching. As the result of the program, the beginning teacher should be able to exhibit such knowledge and skills as:

- Analysis and interpretation of information about students' learning characteristics, cognitive styles, stages of cognitive and psychological development, and levels of achievement;
- Assessment of student learning and progress, including performance abilities, understandings of subject areas and concepts, and types of misconceptions students may hold;
- Selection of appropriate teaching materials and strategies to address curricular goals in the context of students' acquired abilities, understandings, and stages of development;
- Application of teaching strategies in diverse settings with students of varying cognitive and developmental characteristics;
- Evaluation of the effectiveness of teaching materials, instructional strategies, methods of assessment, and feedback to students as they influence students' acquisition of concepts, performance abilities, motivation, and cognitive and social development;
- Recognition of student difficulties that may require additional educational or psychological services, evaluation and consultation, or referral;

- Knowledge of relevant theoretical and practical issues in the diagnosis and management of particular problems of teaching practice, and ability to formulate these considerations in consultation conferences;
- Application to specific teaching and learning problems of knowledge about the psychological, social, biological, economic, and family factors that significantly influence child development and learning;
- Understanding of the legal and ethical aspects of teaching, and ability to apply this knowledge in resolving conflicts among individuals and institutional interests;
- Knowledge of research methodology and the ability to critically appraise professional and scientific literature as it applies to presenting problems of teaching practice.

In addition to providing systematic instruction and substantial experience in acquiring the skills defined as necessary for licensure, an internship should be characterized by:

1. *An appropriate and graduated degree of responsibility for the teaching of students.* The clinical aspect of the program should be organized so that interns may have major responsibility for some classes of students with whom they work, and so that they have an appropriate amount of supervision by the staff. In addition to teaching conferences and classroom responsibilities, each intern should receive sufficient individual supervision on a regular basis to ensure adequate attention to teaching decisions and emerging problems. Initially, the intern should have minimal responsibility for making major technical decisions; therefore, supervision at the start of the internship should be sufficiently frequent that all major decisions are made in consultation with the supervising faculty.
2. *An adequate variety of students and types of classes.* To develop generalizable teaching skills and the ability to exercise judgment in diverse teaching situations, the intern should have major responsibility for working with students at different cognitive stages and performance levels, from differing family backgrounds, and in different subject matter areas within the disciplinary domain. This may be accomplished by varied assignments within a single school or by rotation among assignments within schools in a district. Arrangements across districts are also possible.

3. *Optimal teaching load.* The number of students and classes for which an intern has primary responsibility at any one time should be sufficiently small to permit the intern to attend responsibly to these students and classes while having sufficient time for other aspects of his or her continuing professional development.
4. *Teaching conferences.* The curriculum should include a significant number of clinical conferences and instructional seminars for interns in which program faculty members (selected faculty from within the school or district and from cooperating institutions of higher education) within the teaching area of the intern collaborate with colleagues from other disciplines, grade levels, and educational support specialties to provide a broad perspective on student learning and sound educational practice.
5. *A critical mass of faculty resources and interns.* The program should have a sufficient number of interns and faculty that the clinical and educational components of the internship described above can be fully accomplished.

Responsibilities of Institutions Offering Internship Programs

The sponsoring institution may be a school district or a consortium of school districts and should ideally include the participation of one or more colleges of teacher education. The sponsoring institution is responsible for

- *Designating a director* for the internship program, who is capable of fulfilling the teaching, supervisory, and administrative requirements of the position. Each director should have the authority and time needed to fulfill the administrative and teaching responsibilities required by the program.
- *Supporting faculty time* for participating in the internship program in fulfilling the supervisory and teaching functions defined by the Board of Teaching. Such faculty should have a strong interest in teaching interns. Key faculty should have adequate training and experience and be recognized by their colleagues as possessing substantial expertise in their teaching areas.
- *Establishing a process by which institutional resources are distributed* to accomplish the goals of the internship program, and cooperating agreements with other institutions participating in the program are managed (including specification of the

educational and financial contributions to be made by such participating institutions).

- *Establishing an operational system* for (1) the appointment of teaching staff; (2) the selection of interns; (3) the supervision and evaluation of interns; (4) the provision of a suitable education program; and (5) the identification, assistance to and, if necessary, dismissal of interns whose performance is unsatisfactory.
- *Establishing policies for intern counseling and evaluation*, including a clear statement of the basis upon which interns will be allowed to progress to greater levels of responsibility and a description of how satisfactory scholarship and professional growth of the intern will be assessed.
- *Providing for periodic review of each program* by representatives of the faculty, interns, and administration of the institution, including appraisal of the program's goals, arrangements for meeting these goals, program effectiveness, and use of resources.
- *Providing adequate facilities and resources* to support the educational experiences required by the internship program, including an adequate library providing access to standard reference texts and current journals; sufficient space for intern instruction and consultation sessions; adequate facilities for interns to carry out their teaching and personal education responsibilities; and clinical support services, such as program faculty and specialists in related areas, access to a variety of teaching materials and technologies, and administrative supports.
- *Securing program accreditation* from the Minnesota Board of Teaching.

Evaluation of Interns

The development of procedures for evaluating the progress and accomplishments of interns will be the responsibility of internship program faculty. Such procedures are reviewed by the accrediting body as part of the program accreditation process. The evaluation system should be designed to meet the following goals:

1. Frequent feedback to interns from their supervisors and other faculty about their progress in acquiring each of the basic teaching skills defined by the Board of Teaching as prerequisites for licensure;

2. Establishment of concrete tasks and opportunities for interns to study and practice these skills, with special emphasis on opportunities for acquiring those skills that have not been adequately practiced and mastered;
3. Assessment of performance by program faculty and the supervising teacher(s) at regular intervals, including written assessments conveyed to the program director at specified points in the internship with recommendations for continuation in the program and areas of further needed development specified;
4. Consultation following assessments between the program director or designated faculty member with the intern to convey findings and recommendations;
5. A summative assessment at the conclusion of the internship program as to whether the intern has sufficiently mastered the basic teaching skills to be considered for continuing licensure.

TEST OF TEACHING SKILLS

Upon successful completion of the internship, the candidate for a continuing license will be eligible to take the Board of Teaching's Test of Teaching Skills. This test will measure the candidate's skills in analyzing teaching situations and performing essential teaching tasks. It will not be a test of discrete behavioral skills or a test of recall of prescribed responses. Instead, it will assess the candidate's ability to exhibit skills related to effective teaching.

Basic Principles

The Test of Teaching Skills should be based on principles that must govern licensing tests. These principles include:

(1) *Specific knowledge and skills should be tested only after candidates have had an opportunity to master them.* It is appropriate to test subject-matter mastery and reading, writing, and mathematics skills at the conclusion of the academic portion of a teacher's academic program because candidates have had sufficient opportunity to acquire the requisite knowledge. However, practice teaching requirements in such programs rarely provide the experience that is needed to develop the skills that are required for carrying out teaching tasks—or at least not developed to a point that any test of these skills would produce meaningful results. And, for a teacher licensing test to be valid, it must test a candidate's ability to perform such tasks.

These considerations suggest that candidates should be tested for a continuing license only after they have had a chance to practice applying their academic training to actual classroom situations. This can be achieved by requiring candidates to complete the internship requirement.

(2) *Testing for licensure should include assessment of a broad range of requisite knowledge and skills.* Continuing licensure should be based on a teacher's ability to perform a wide range of job-related tasks. Although no test can measure everything that is important, a test can sample tasks from an array of job activities. The sampled tasks, as a group, can therefore represent the spectrum of things that teachers are expected to do on the job.

The ability to perform certain tasks (such as preparing an appropriate lesson plan for students with certain characteristics) is a prerequisite for performing other tasks (such as giving that lesson effectively). This built-in relationship among tasks allows for the systematic sampling of tasks and can enable the test to focus on those skills that are measurable within the practical constraints of testing technology.

(3) *Licensure tests should be based on a generalizable and reliable assessment of knowledge and skills.* Teachers are not licensed to instruct a particular group of children, such as "fifth graders at Kennedy Elementary." Instead, they are licensed to teach children who differ with respect to grade level, general intellectual ability, educational opportunity, socioeconomic status, family attitudes toward education, and many other characteristics. Observing a candidate's ability to instruct children in one classroom provides little information about whether that candidate is likely to be effective in teaching children with very different characteristics and educational needs. Thus, a teacher licensing test must assess competence not in one context but in the context of a variety of instructional situations.

To ensure that the assessment is fair and that the scores are interpretable, all the candidates for a given license must take the same (or equated) test under standardized conditions. In addition, the examination must contain a number of tasks so that the total score across tasks will be sufficiently reliable to make pass/fail decisions on individual candidates. A number of tasks are needed to balance the effects of random factors on candidate scores.

These considerations and the practical need to limit testing time to one or two days mean that candidates should be given a series of short (30 to 90 minute) tasks that include many different teaching situations rather than a few very long problems.

General Plan

Licensure should be a three-stage process: entrance licensure, internship, and continuing licensure. These three stages are described below.

Entrance Licensure. Entrance licensure is granted if the candidate passes the tests of reading, writing, mathematics, and subject matter. These examinations are prerequisites for internship positions.

Internship. The internship is an educational experience. Its primary purpose is to improve the teaching skills of beginning teachers. The internship gives candidates experience in applying the knowledge they gained in their academic training to day-to-day teaching activities. Thus, it provides them with an opportunity to practice, under supervision, skills that will be tested on the examination for a continuing license.

Candidates are eligible to take the Test of Teaching Skills only if they satisfy the internship requirement and receive the endorsement of the director of their internship program.[3]

Continuing Licensure. A continuing license is granted after the candidate passes a test that assesses his or her ability to carry out many of the important tasks and activities that teachers are expected to perform. Ideally, the test will include both written and oral tasks that assess the degree to which the teaching skills defined by the Board of Teaching have been acquired.

Examples of possible written tasks are: preparing a lesson or unit plan; grading student essay answers or other products and then developing appropriate strategies for proceeding with instruction; selecting resource materials to be used in conjunction with a specified text; preparing or editing a classroom test; diagnosing student difficulties (based on assessment results, student products, or a videotape showing a student performance); and critically appraising how research results might be applied to a problem of teaching practice.

Oral tasks might include having the candidate give a short lecture on a specified subject; presenting a case evaluation in a clinical consultation session; and, after observing a videotape of a student performing a task, describing how the student might be counseled regarding that performance. Before an oral task, the candidate would be given time to review classroom materials regarding the subjects to be covered as well as other background information about the students and the class. The oral tasks could be observed by a panel of evaluators or videotaped for later evaluation.

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[3]An additional advantage of staging is that only those who have satisfied the internship requirement and who still want to teach will be tested.

A generalized test plan would be used to construct similar tasks for elementary and secondary teachers. This general plan (and scoring guide) would be developed by a team of expert educators who work in conjunction with measurement specialists. However, some tasks could be embedded in particular subject-matter contexts. In these cases, separate teams would draft particular tasks (and scoring guides) for each subject area. Test answers would be graded by experienced teachers trained to use a scoring guide.

This approach emphasizes performance assessment and the ability to apply knowledge in specific types of teaching situations, rather than assuming that recall of isolated facts or simplified answers to complex problems suffice to evaluate teaching skill. The approach mirrors those recently pursued in architecture, engineering, medicine, and law and can capitalize on the test development technologies now used in these professions. Furthermore, these types of performance assessments have been found to enhance the credibility of examinations in the eyes of candidates, practicing professionals, and the public—an important criterion for licensing examinations that must not only screen candidates reliably but do so with the appearance and genuine prospect of screening on valid bases.

Of course, it will be a long time before the approach is sufficiently validated. Major changes in educational and licensing requirements cannot be justified by research in advance of their use nor can they be fully justified by research even after their use. Requirements that medical students and law students be college graduates cannot be justified by empirical inquiries that demonstrate that liberal education makes them better practitioners. Instead, they must be justified by the arguments that liberal education prepares a more thoughtful (and perhaps more humane) practitioner or that it makes them better professional school students or that it matures them. Arguments for upgrading teacher education will have the same quality. Should teacher education be a four-, or five-, or six-year sequence? Teacher educators, looking for lessons, will find no empirical studies that justified the shift of legal education to postgraduate status or evidence that legal studies require three years rather than two.

The utility of upgrading licensing procedures poses similar problems for educators steeped in the empirical traditions. Before we can know the full effects of a new licensing system, it must first be implemented for a period of years. It will take some time for validity studies to determine whether the test adequately predicts who will be a good teacher. However, determining the ultimate payoff requires going beyond the empirical relation between test performance and teaching performance. It will require professional and societal validation that

teachers have been well-prepared for teaching and that only those who can teach are allowed to teach.

CONTINUING PROFESSIONAL DEVELOPMENT

It should be noted that the licensure procedures proposed here are intended to certify that successful candidates have mastered basic teaching skills, so that they may practice independently without harming students. A key criterion for success in the internship is recognition on the part of the candidate of the need for continuing professional inquiry and development of the capacity for reflective practice. Over the course of the teaching career, then, growth in knowledge and ability is to be expected and encouraged through other vehicles. These include continuing education requirements for relicensure, and the availability of recognition and increased responsibility through professional specialty board certification as will eventually be offered by the National Board for Professional Teaching Standards recently established by the Carnegie Task Force on Teaching.

The National Board examinations will complement the licensing standards for beginning teachers we have proposed. The National Board is expected to produce extremely rigorous assessments of high levels of competence for teachers who have developed highly specialized knowledge in finely defined areas of teaching practice (e.g., middle school mathematics).[4] These assessments, pursued voluntarily by experienced teachers, will serve as a beacon for the development and recognition of standards of teaching excellence. Teachers who have begun their professional careers in the manner we have described should be among the first to pursue and successfully acquire specialty board certificates when they become available. Having gained an appreciation for the richness of the knowledge base and for the complexity of judgments underlying effective teaching, these teachers will be well embarked on the path of continuing professional development.

[4]Prototype items for these examinations are currently being developed by Professor Lee Shulman of Stanford University.

V. IMPLEMENTATION

The internship and Test of Teaching Skills proposed do not now exist. A period of development is therefore necessary before they can be fully phased in.

DEVELOPMENT

The Board of Teaching should design and administer a grant competition that will encourage alternative approaches to designing internships that meet specifications established by the board. Eligible grantees will be school districts or consortiums of school districts, independently or in cooperation with colleges of education. School districts must assume the lead for the simple reason that they will employ (and pay) interns. The lesson of other professions is clear. True internships (as distinguished from short-term practicums) always take place in settings where services are actually delivered. Interns can be paid only if they are directly contributing to service delivery; such responsibility is also a necessary part of the intern's learning experience. Unless the intern is providing actual services, he or some other agency must finance the final phase of preparation. That is an added cost avoided in all professions that have internships by requiring the intern to deliver services, albeit under supervision.

Different configurations should be encouraged and tested. Particularly at the beginning, some school districts will find it convenient to assign interns where vacancies exist. However, under this approach, the supervision of interns poses logistical problems if the goal is to match interns with experts in their fields. Other districts or consortia of districts may wish to create professional development or induction schools. These would be schools designed and staffed to induct new teachers. Some configurations will make sense in large districts; others in rural areas.

Alternative approaches to cost should also be explored. Since interns will be assuming responsibility for teaching some classes of students and their levels of compensation will be less than those of fully qualified teachers, some of the savings in delivering services will partially offset the costs of providing support to the program. Different mixes of interns and senior teachers can be tried. Different approaches for elementary and secondary education may be indicated because of the differences in the organization of instruction. Costs may vary

depending on the existing supervisory and training capacities of sponsoring institutions, and the costs of capacities that will need to be developed.

The possible effects on supply and demand for teachers should be assessed: How does this approach affect demand for teachers, given that more time for experienced teachers is required? How does this approach affect the supply of teachers willing to spend the extra time to get continuing certification? Does this affect the supply of teachers in particular fields (e.g., math) or those with particular characteristics (e.g., minority teachers) more than the supply of other teachers? Given that interns would begin to teach for compensation at the same time they normally would, the effects on supply may not be pronounced in many fields. In other fields, though, shortages could be exacerbated by additional requirements, unless steps are taken to encourage candidates, such as through grants or forgivable loans for education expenses.

Following an initial period of exploration encouraged by grants, the Board of Teaching will no doubt want to settle on a small number of acceptable internship configurations. At this point, the state will want to make internships more generally available. Many school districts will want to take advantage of the benefits of sponsoring internship programs and will be able and willing to invest institutional resources to do so. However, in the interests of improving the quality of state licensure and dispersing the benefits of internship programs across areas and types of school districts in the state, the Minnesota legislature should actively encourage the establishment of high-quality programs by funding the development and continued operation of internships. As in the medical profession, such support may be accomplished both through direct grants to sponsoring institutions and through adjustments in basic state aid formulas, which include additional weightings to student or teacher counts for sponsoring institutions. These weightings (such as those applying to third-party reimbursements for teaching hospitals) are set to be commensurate with the additional costs accrued by providing faculty time for conducting and participating in the training of new entrants to the profession. Not all school districts will be able to or will want to sponsor internship programs. Not all teachers who receive a continuing license will want to remain in the school district or districts in which they served their internships. As in other fields, professionals may prepare in one area and wish to work or live in another area.

To assure the quality of internship programs, the state should provide resources to support the accreditation of such programs by the Minnesota Board of Teaching; this accreditation should include site

visits by appropriate accrediting committees and review of program documentation and evaluation.

The Test of Teaching Skills also needs to be developed. The test proposed, based upon lessons learned from other licensing tests, is well within the state of the art. Options for the test need to be generated and assessed. Costs will vary depending upon the nature of test stimuli (written, oral, video) or on the nature of responses (written, oral, taped). Initially, the substantive specifications for the test based upon the outcomes specified in Sec. IV need to be generated and sample components need to be developed. Once the test has been fully conceptualized, it will need to be developed, validated, and pilot-tested. After the test has been given a few times, a more extensive validity study should be conducted. The Test of Teaching Skills will be expensive to develop, and Minnesota may wish to join with other states or national agencies to develop it.

Among the major issues to be decided is whether the test will be a paper-and-pencil test. This approach would restrict the range of abilities that can be measured to mastery of knowledge, reasoning skills, and writing ability, but would keep development and administrative costs relatively low. Most bar examinations, for example, assess applicant ability in applying knowledge of basic legal principles to hypothetical but realistic fact situations. The candidate must then use legal reasoning skills to determine which facts favor each party, how the case should be resolved, or what is the appropriate rationale for this resolution. The essay portion of the bar examination further assesses an applicant's abiiity to identify legal issues and facts in a case situation, identify the relationships among the issues and facts, and to present in writing an organized and coherent analysis of these matters relative to how the case should be resolved. For example, a typical essay question might ask the applicant to explain why party A's and B's actions did or did not lead to a valid contract between them and what effect this had on some other aspect of the case.

This type of question is analogous to asking a teacher to prepare a lesson plan on a given subject in the context of hypothetical factors that are related to basic principles of teaching. For instance, the teacher candidate would be told about the age and other salient characteristics of the children to be taught. It clearly differs from asking the teacher to present that plan just as the bar examination does not ask an applicant to orally counsel an actual client about the strengths and weaknesses of his case and alternative courses of action.

The use of a written examination helps to rule out allegations of favoritism. On an oral test, the interviewers or evaluators are aware of the race, age, sex, and perhaps even the socioeconomic status of the

candidate. Thus, conscious or unconscious biases can theoretically affect their judgments of a candidate's ability. Written tests allow all applicants to be asked the same questions at the same time. This critical feature eliminates the standardization and test security problems that inevitably follow from oral or other types of performance measures in which all candidates cannot be tested simultaneously. Although many important skills cannot be measured within the constraints of standard written tests, knowledge and skills that are tested with paper-and-pencil tests are often *prerequisites* for other abilities. Other factors that lead to the reliance on written tests are the impracticality of interviewing thousands of applicants per year; the relatively high costs of developing and scoring other types of measures; the delays that scoring such measures might produce in reporting results to candidates; and the upper limit of the test development, printing, administration, and scoring costs that licensing boards (or state legislatures) are willing to pass on to candidates.

Because written examinations measure only a portion of the knowledge and skills necessary for practice, other approaches should also be explored. Candidates might be furnished with an array of information and then be required to respond in writing. For example, candidates might be given information about hypothetical groups of students, a set of learning objectives, and alternative instructional materials. The requirement would be to study these and develop an appropriate lesson plan or plans. Or candidates might be shown a videotape of a classroom and asked to analyze teacher or student behavior and perhaps to prepare and defend a course of action. Results in other fields indicate that reliable examinations in alternative non-paper-and-pencil modes can be developed. However, not surprisingly, developing and administering these examinations can be several times as costly as a written examination.

COSTS

The costs of development and implementation could vary substantially depending on the strategic choices made. Here we describe one approach, for the purpose of exploring cost implications and illuminating the factors that will influence these costs.

We have proposed that the internship be implemented in two phases. In the first phase, the Board of Teaching would sponsor a grant competition. School districts and consortiums of school districts, independently or in cooperation with schools of education, would submit proposals to create internship programs (possibly in special

induction or professional development schools). Each proposal would be judged on its merits and on its costs. These induction programs would be funded for three years during which they would be studied by the Board of Teaching.

We propose that the state budget at least $700,000 for each of three years to create approximately 10 induction programs, each to receive on average $70,000 per year for three years. We say "on average" because proposals may vary considerably depending upon how much is contributed by school districts and schools of education, numbers of interns to be served, and whether or not interns receive full or fractional pay. (It is expected that school districts will pay the full cost of the teaching services provided by the interns. School districts may also be expected to contribute the resources they would normally expend for new teachers' supervision and staff development. State funds are to be used to help pay for the added costs of supervising interns and providing them with individual counselling and seminars.)

As the Board of Teaching studies the implementation of these 10 induction schools, it will be formulating guidelines for phase 2 or full implementation. In phase 2, all beginning teachers would be required to successfully complete internships. We estimate that the cost of a supervised internship will be approximately $3500 per intern. The cost of the internships statewide will be directly proportional to the number of beginning teachers hired. In 1985–1986, Minnesota school districts hired about 1600 beginning teachers. Had the program been in operation, it would have cost about $5.6 million: Over the next 5–10 years, the number of beginning teachers will probably rise to about 2000 annually.

The estimate of $3500 is derived as follows:

Assume that an internship program serves 20 interns. Assume that a senior teacher allocates the equivalent of 1/2 day per week to each intern. Assume that senior teacher salaries are $27,000. Assume that a half-time program director is responsible for assignments, seminars, evaluation, etc. Assume a seminar expense budget of $2500 (for additional seminar leaders).

Program Element	Cost per Intern	Total Costs
Supervision	$2700	$54,000
Administration and instruction	675	13,500
Seminar expenses	125	2,500
Total	$3500	$70,000

Obviously, costs will vary, depending especially upon the number of interns to be served. In particular, the per intern costs of administration, instruction, and seminars will drop as the number of interns increases.

It is important that phase 1, the development phase, be approached experimentally. Although we have used a few assumptions *for budget purposes*, those who wish to participate in the grant competition should be given wide latitude in their design of induction programs. The purpose of phase 1 is to generate and evaluate a number of models.

Although the state should fully finance the costs of the phase 1 developmental effort, the Board of Teaching can explore the effect of reducing the state's cost as the program becomes operational. School districts with induction programs should have an incentive to share costs, since they will be able to offer improved teaching quality in professional development schools. Colleges of education may have an incentive to share costs, since professional development schools are at the "cutting edge" of teacher education. Finally, some consideration may be given to reduced pay for the internship year. Obviously, if each intern received $3500 less in pay, the program, as estimated, would entail *no* added costs.

The Test of Teaching Skills should also be implemented in phases. Phase 1 would involve the development and testing of two prototype tests—one for elementary school teachers and one for one area of secondary school teachers.

The cost of developing the prototype is estimated at $400,000. It is assumed that the Board of Teaching would contract with a research or testing firm to develop this innovative test. The development of the prototype will require expertise on research on teaching and test development and will require extensive participation by practicting teachers and teacher educators. The prototype phase will yield a pretested examination that can be used by the Board of Teaching for licensing elementary school teachers and one area of secondary school teaching.

The next phase will be the development of alternative forms of the test for full-scale testing of all beginning teachers. The development of alternative forms will be less expensive than the development of the prototype. Prototype development of a new test is necessarily the most expensive phase; each of 20 areas of secondary school teaching will cost $50,000 to $75,000, or a total of $1 million to $1.5 million. It is not likely that Minnesota will have to fully finance the second phase. Test developers (possibly aided by private foundations) are likely to vie for the opportunity to move into this important arena of teacher testing. For them it also constitutes a major new market. Other states have

also expressed interest in the development of this kind of test, and consortia may be established to help share costs.

When the test becomes fully operational, there may be no cost to the state. The widespread convention is for test-takers to pay for the privilege of taking a test. Two models exist. The state can manage the testing program itself and charge a fee (probably about $125). This fee would be enough to cover the costs of administration and scoring and even the continuous improvement of the test itself. Or the state can contract with a testing firm which would likely charge a comparable fee to candidates. The following table summarizes the costs.

	Amount ($)	Source of Revenue
Development (Over three years)		
Test prototypes	400,000	State/foundations
Full test development	1,000,000–1,500,000	State/other states/foundations
Internship models	2,100,000–2,500,000	State
Technical assistance and evaluation	300,000	State
Subtotal	3,800,000–4,700,000	
Operations (Annual cost estimate based on 2000 candidates per year)		
Internship program operation	7,000,000	State/local/districts/schools of education
Test operation	250,000	Candidates
Subtotal	7,250,000	

CONCLUSIONS

With appropriate levels of investment, the Board of Teaching could be in position to impose these new requirements by the early 1990s. Given Minnesota's teacher demand and supply profile, the state is in an excellent position to proceed deliberately to design and install the most advanced teacher licensing system in the United States. Minnesota could become the first state in the nation to have a reliable and valid licensing system for teachers. It could become the first state to be able to warrant to its citizens that all beginning teachers have knowledge and teaching skills and are competent to practice.

Establishing rigorous standards is the first step. Of equal importance is the political determination to enforce those standards. A professional licensing system will not generate public confidence and trust if its requirements are not enforced or are unevenly enforced. The Board of Teaching will need sufficient legal and moral authority to withstand pressure to compromise standards if demand exceeds supply. Beyond licensing, of course, lies the future deployment of teachers in the schools. Will school management change to accommodate a profession of teaching? Will working conditions and salaries improve so that talented young people will be drawn to teaching in sufficient numbers? Requirements and incentives must be in balance if we are to create a professional teaching force—one with the capacity and the responsibility to prepare students to face the 21st century.

Appendix A

A BRIEF REVIEW OF EXAMINATIONS IN OTHER PROFESSIONS[1]

The examination has become an important teacher certification tool. A decade ago, teachers could be certified to teach by graduating from an approved teacher training program. Today, many teachers are also required to pass examinations before entry to the classroom. These examinations assess teacher candidates in basic skills, general knowledge, professional knowledge, and knowledge of the teacher's specialty area. The rush of legislation mandating these examinations reflects the policy goal of enhancing teacher quality by preventing unknowledgeable teachers from entering classrooms. These recently implemented examinations may increase the status of teachers and buttress public support for the professionalization of teaching.

However, in the past year, there has been growing support for the development of a professional examination that establishes a high standard. This support has come from the Carnegie Forum's Task Force on Teaching as a Profession as well as from the national teachers' organizations. Lareau (1985), in her assessment of examinations in teaching in relation to those in other professions, has noted:

> Presumably, a professional examination in teaching would differ from existing teacher examinations offered by departments of education in several states. The content and structure of a professional examination, however, remain open to debate. There are many questions to explore here. For example, should a professional examination in teaching be primarily "backward looking" and test subject matter knowledge taught in teacher education programs? Or is it more important for an examination to be "forward looking" and assess the instructional skills of prospective teachers? What is the knowledge base in the teaching profession? Are there skills that teacher training programs should impart to all students? If so, what are these skills? Which of these skills can be systematically measured with an examination? These are important questions that are not unique to the teaching profession. Other professions have struggled with similar problems as they have developed their own professional examinations.

[1]Appendix A was prepared by Barnett Berry.

In an effort to better understand these issues, we will briefly describe the examinations used by four professions—medicine, law, architecture, and engineering. However, a few caveats are in order. First, the licensing examinations in these four professions are quite complex and space does not allow for comprehensive descriptions. Second, the four professions are quite different from teaching—especially with regard to the role of the knowledge base in the profession and its implications for the examination. Finally, the four professions—when compared to teaching—use other rigorous screening tools and have more lengthy training requirements. For example, upon graduation from an undergraduate institution, prospective physicians must take the Medical College Admissions Test (MCAT).[2] Most prospective physicians then take a three-part board examination during their five-year graduate training program. In addition, these physicians receive further training (and informal assessment) during their residency programs, which can last from one to ten years.

MEDICINE

After completing four years of undergraduate education and five years of medical education from an American Medical Association approved program, physicians may become licensed to practice by taking and passing one of two series of examinations.

First, a medical school graduate may take an examination offered by state boards of medical examiners. Previously, these state boards offered different examinations. However, the boards have now formed a federation—the Federation of State Medical Boards—which offers the federal licensing examination (FLEX) in medicine. FLEX is a two-part examination; FLEX I is taken after four years of medical school and FLEX II is taken after a year of internship. Currently, all state boards offer these standardized, multiple-choice examinations. If a candidate passes both parts, then he or she—through reciprocity agreements—may practice medicine in any state. Graduates of foreign medical schools are eligible to take the FLEX to become licensed to practice medicine in the United States. Approximately 25 percent of medical school graduates take the FLEX.

[2]Johns Hopkins School of Medicine—one of the nation's most prestigious medical schools—has recently dropped the requirement that applicants take the MCAT. This change in policy reflects the school's goal in attracting more "well-rounded" students who have not necessarily "focus[ed] too narrowly on science courses" while in undergraduate schools. However, Johns Hopkins is only the second medical school in the nation to waive the MCAT admissions requirement. (The University of Rochester was the first medical school to do so in 1977.)

Second, a medical school graduate may take a series of examinations (Parts I, II, and III) offered by the National Board of Medical Examiners (NBME). A student need not wait until completion of any specific year of the medical school curriculum to take either Parts I or II. (In fact, Part I does not have to be taken before Part II.) To be eligible to take these examinations, a student must be enrolled in either an American or Canadian medical school accredited by the Liaison Committee on Medical Education (LCME). A candidate is eligible to take Part III when he or she has received an M.D. degree from an LCME accredited program and is serving in an accredited graduate medical education program. This internship program is the "fifth year" of medical education. An individual must register as a candidate for National Board certification to sit for the Part III examination.

Because most medical school students and graduates take the NBME examinations, we will report them in some detail:[3]

> *Part I*, a two-day written (multiple-choice) examination in the basic medical sciences, includes questions on anatomy, behavioral sciences, biochemistry, microbiology, pathology, pharmacology, and physiology. Each subject contributes approximately the same number of questions to the examination. The examination consists of a total of six test books with questions from each of the seven disciplines appearing in each book. The questions have been devised to test not only the examinee's knowledge, but also the subtler qualities of discrimination, judgment, and reasoning. The content of some questions crosses over the lines of disciplines. Examples are questions in such categories as molecular biology, cell biology, and genetics. Knowledge in biostatistics is assessed by including a small number of items across all subjects of Part I. Certain questions test the examinee's recognition of the similarity or dissimilarity of diseases, drugs, and biochemical, physiologic, behavioral, or pathologic processes. Other questions evaluate the examinee's judgment as to whether cause and effect relationships exist. Descriptions of laboratory situations or problems presented in narrative, tabular, or graphic form are followed by series of questions designed to determine the examinee's knowledge and comprehension of the situation described.
>
> For example, in the section drawn from the basic science subjects exam (Part I), a student may be presented with the following:
>
> **Questions 31–32**
>
> A 68-year-old physician, apparently well except for mild diabetes mellitus and essential hypertension (blood pressure 160/95 mm Hg), both of about 10 years' duration, felt severe crushing precordial pain while

[3]Excerpted from "Bulletin of Information and Description of National Board Examinations" (1986), and Hubbard (1978).

shoveling snow. He collapsed and was taken to a hospital, where he was found to be in shock and cyanotic, with hypotension and a rapid, feeble pulse. Given oxygen and supportive therapy, he improved somewhat, his blood pressure returning to its formal level. Six days after admission, while using the bed pan, the patient died suddenly. At autopsy, extensive myocardial infarction was found.

31. Examination of the kidneys would be most likely to disclose

    (A) acute pyelonephritis

    (B) acute glomerulonephritis

    (C) benign nephrosclerosis

    (D) malignant nephrosclerosis

    (E) chronic glomerulonephritis

32. The most likely cause of the myocardial infarction was

    (A) syphilitic aortitis with occlusion of a coronary orifice

    (B) embolus to a coronary artery

    (C) dissecting aneurysm with occlusion of a coronary orifice

    (D) occlusion of a coronary orifice due to atheroma

    (E) coronary thrombus on the basis of an atheroma

Part II, also a two-day written (multiple-choice) examination, covers the clinical sciences and includes approximately the same number of questions in each of the following subjects: internal medicine, obstetrics and gynecology, pediatrics, preventive medicine and public health, psychiatry, and surgery, each with related subspecialties. The examination consists of six test books with questions from each of the six disciplines appearing in each book. The questions, of the same form as those in Part I, are designed to cover a broad spectrum of knowledge in each of the clinical areas. The examination includes an emphasis on the presentation of clinical problems in the form of case histories, charts, roentgenograms, pictures of gross or microscopic pathologic specimens, tables of laboratory data, and other graphic or tabular materials; one or more questions are asked regarding the interpretation of these materials as they are related to clinical problems. These questions are designed to explore the extent of the examinee's knowledge of clinical medicine and to test the ability to use information from both clinical and basic science areas in developing solutions to these clinical problems.

For example, in the section drawn from the clinical subjects exam (Part II), a student may be presented with the following:

Questions 36–37

A physician is called to an apartment to see a new patient. He finds

the markedly jaundiced body of a young woman, whose alleged sister gives the following history. Five days previously the patient, who thought she was pregnant, had gone to see a man who inserted a catheter into the uterus to produce an abortion. Following this, she became very ill. She died shortly after the sister called the physician.

36. The physician should immediately

    (A) call in a consulting obstetrician

    (B) send the body to the nearest hospital for an autopsy

    (C) sign the death certificate, giving the cause of death as "abortion"

    (D) notify the police and await their instructions

    (E) send the body to the nearest mortuary and call the police

37. The most likely underlying cause of death is

    (A) liver failure

    (B) *Clostridium perfrigens* septicemia

    (C) acute glomerulonephritis

    (D) *Escherichia coli* septicemia

    (E) *Staphylococcus aureus* septicemia

Part III is a one-day examination, as the final examination for National Board certification, intended to measure a candidate's possession and use of medical knowledge which is deemed appropriate for the unsupervised practice of general medicine. Part III consists of four sections: the first three employ standard multiple-choice techniques similar to those of Parts I and II; the fourth section employs a patient management problem (PMP) format to evaluate knowledge and strategies in diagnosis and management.

The first three sections of the Part III examination are made up of multiple-choice items. About one-third of these items are devoted to each of the physician competencies, clinical database, clinical diagnosis, and clinical management. The examination also incorporates a variety of pictorial and graphic material presenting clinical or laboratory findings and exploring the indications, interpretations, and the implications of these findings for the management of the involved patient. (The examination covers points in clinical database, clinical diagnosis, and clinical management as they pertain to patient problems.)

For example, in the section drawn from clinical problems based on pictorial material, a student may be presented with the following:

Questions 7–16

DIRECTIONS: Study the four electrocardiograms (A, B, C, D) shown on the following pages. For each numbered word or phrase below, select the answer in accordance with the following:

(A) if associated with pattern shown in electrocardiogram A

(B) if associated with pattern shown in electrocardiogram B

(C) if associated with pattern shown in electrocardiogram C

(D) if associated with pattern shown in electrocardiogram D

(E) if associated with none of the electrocardiographic patterns shown

7. Hyperthyroidism

8. Digitalis is the drug of choice

9. Hypokalemia

10. Hyperkalemia

11. Heart rate varies with respiration

12. History of paroxysmal tachycardia since childhood

13. Commonly found in children

14. Administration of anticoagulants may be of value

15. Digitalis toxicity

16. Paradoxical pulse

The fourth section of Part III consists of PMPs that present medical problems in a manner resembling actual clinical encounters. For actions deemed appropriate (in history taking, physical examination, other diagnostic evaluations, or management), the PMP format is able (through a latent image exposed by a special pen) to give the examinee the results of the choices made, upon which the examinee can build a logical approach to and path through the problem to an appropriate solution. Many PMPs move sequentially from presenting a problem through several steps in evaluation (history, physical examination, laboratory or other diagnostic studies) to choices in management that will depend, as the problem unfolds, upon the information developed at each step. The score for the PMP is based upon the number of appropriate options that are selected and the number of inappropriate ones that are rejected.

An example of a Patient Management Problem follows (on the next eight pages).

Part III—Patient Management Problems: Questions 1–43

GENERAL INSTRUCTIONS

This test is designed to assess certain aspects of clinical problem solving. You will be given an opportunity to obtain clinical information, to order diagnostic studies and procedures, to make diagnostic hypotheses, to prescribe therapy, and to make other decisions regarding each of a number of patients. Your task is to determine which options you consider appropriate, just as you would be expected to do if you were managing an actual patient.

A series of problems is associated with each patient. For example, the problems associated with Patient A are identified as Problem A-1, Problem A-2, Problem A-3, etc. The problems for each patient should be undertaken in the order in which they are presented.

Initial information is given for each patient. Following this initial information, the first of a series of problems (Problem A-1) for that patient (Patient A) is presented. This problem consists of a numbered list of possible courses of action arranged in random order. You are not told how many courses of action are considered correct, for each problem, your task is to select those diagnostic or therapeutic procedures that you think should be done for this patient at this point in time.

First, read all of the courses of action listed in the problem. Then select a study or procedure that you think should be done. Move across to the identically numbered rectangle to the right of this action and, using the special pen provided, carefully—lightly—rub the area within this rectangle. Within seconds, there will appear printing that designates feedback indicating the result of this action. The end of each feedback is identified by an asterisk (*). Always develop each selected response one at a time until you reach the asterisk (*). The information you receive may lead you to select other procedures within the same problem, or you may decide to make other choices quite independent of results already obtained. After you have completed Problem A-1, and bearing in mind the additional information resulting from your decisions, proceed in a similar manner with Problem A-2, etc.

> The response that appears in the rectangle does not necessarily indicate that the choice is correct or incorrect; for correct as well as incorrect choices, the following kinds of responses will appear in the feedback:
>
> (1) When you order a diagnostic study (e.g., blood glucose, electrocardiogram, etc.), or a diagnostic procedure (e.g., liver biopsy, thoracentesis, etc.), specific data may be reported, or the response may indicate that the study or procedure was ordered or done.
> (2) When you order a therapeutic measure, the response will usually simply indicate that therapy was given or ordered.
> (3) Where the response differs from those listed above, the response given will be self-explanatory (e.g., "Patient refuses operative procedure")

Your score on this section of the examination will be based on the total number of correct decisions that you make. Selecting indicated options and avoiding unnecessary or contraindicated options will improve your score. Any exposure in a rectangle that reveals any portion of the underlying answer will be treated as a selection; be careful not to let your special pen accidentally rest on a rectangle that you do not select.

PATIENT A

There are 5 problems related to Patient A. These 5 problems should be undertaken in sequential order. Choices within each problem, however, may be made in any order.

General Information

A 45-year-old man is admitted to the hospital because of pain in his right hip and pelvis, especially when walking. He had lost 30 pounds in weight in the past year, during which time he did not feel strong or well enough to work. Three months prior to admission, he developed an acute upper respiratory infection and noted an increase in his symptoms with generalized "pain in my bones and stiffness of my joints." At that time, he also noted generalized numbness with tingling and stiffness of his hands; he had difficulty talking because his jaws and lips became stiff, making it difficult to form words.

Twenty years earlier he had had similar symptoms which he described as "pain all over." At that time, he was studied at a hospital for bone and joint disease, where he was told he had "osteoporosis." During the intervening years, he has been relatively well.

Physical Examination

Temperature is 37.0 C (98.6 F); pulse rate is 80 per minute and regular; blood pressure is 120/80 mm Hg. The patient is well developed and appears well nourished. The lungs are clear to percussion and auscultation. The heart is normal in size; there are no murmurs. The abdomen is protuberant but no masses or organs are palpable. There is tenderness in the right groin on palpation but no mass can be felt. There is 2+ edema of the legs but the extremities are otherwise normal. Neurological examination shows no abnormalities. Walking causes severe pain in the right hip and pelvis as well as pain in the feet.

Initial Laboratory Studies

Hemoglobin	10.6 gm/100 ml
Hematocrit	35 per cent
Leukocyte count	6,800/cu mm, neutrophils 60, lymphocytes 34, monocytes 5, eosinophils 1
Erythrocyte count	4,000,000/cu mm
Urine	Specific gravity 1.015, pH 5.5, protein 1+, glucose and acetone negative; microscopic examination: 3-4 WBC, 1-2 RBC per high-power field, no bacteria, casts or crystals
Roentgenogram of the chest	Lung fields clear

Problem A–1

With the understanding that all elements of the history are important, inquiries about which of the following are specifically pertinent with regard to this patient's problem?

1.	Appetite		#
2.	Consumption of citrus fruits, juice, or foods containing ascorbic acid		#
3.	Frequency, volume, consistency, and description of stools		#
4.	Transfusions, injections, "needles"		#
5.	Exposure to people with cough, fever, or known infectious illness		#
6.	Rickets in childhood, intake of vitamin D, exposure to sunlight		#
7.	Sore throat, streptococcal infection, evidence or diagnosis of nephritis or kidney disease in childhood		#

If you select this option, turn to page 176 to learn what would appear upon developing this box with the "special pen" in the actual examination.

8. History of hot, red, or swollen joints [ ] #

9. Family history (siblings, parents) of skeletal deformity or "bone" pain [ ] #

Problem A–2

You would now measure

10. serum transaminases [ ] #

11. serum calcium and phosphorus [ ] #

12. serum alkaline phosphatase [ ] #

13. serum sodium, potassium, chloride, and bicarbonate [ ] #

14. blood urea nitrogen [ ] #

15. serum iron and total iron-binding capacity [ ] #

16. serum acid phosphatase [ ] #

17. phosphate clearance [ ] #

18. antistreptolysin-O titer [ ] #

19. bromsulphalein excretion [ ] #

20. serum uric acid [ ] #

If you select this option, turn to page 176 to learn what would appear upon developing this box with the "special pen" in the actual examination.

Problem A–3

On the basis of your findings up to the present time, which of the following studies would you expect to yield helpful information?

21. An intravenous pyelogram
22. Roentgenograms of the skeleton
23. A Schilling (radioactive cyanocobalamine excretion) test
24. Determination of fecal fat excretion
25. A glucose tolerance test (oral)
26. A D-xylose tolerance test
27. Cystoscopy
28. Roentgenograms of the small intestine
29. A barium enema

Problem A–4

You would now order

30. a liver biopsy
31. a renal biopsy

If you select this option, turn to pages 176–177 to learn what would appear upon developing this box with the "special pen" in the actual examination.

32. a bone marrow examination

33. a biopsy of the small intestine

34. an exploratory laparotomy

Problem A–5

Therapy would consist of

35. ferrous sulfate by mouth

36. transfusion with whole blood

37. vitamin D and calcium orally

38. a special diet

39. ammonium chloride

40. a sodium citrate-citric acid mixture orally

41. cyanocobalamine parenterally

42. ascorbic acid orally

43. exploration of the neck for a parathyroid adenoma

If you select this option, turn to page 177 to learn what would appear upon developing this box with the "special pen" in the actual examination.

PATIENT A

Problem A-1

1. Normal *
2. Fresh orange juice daily *
3. Greasy, bulky stools *
4. None *
5. No exposure *
6. No rickets, no exogenous vitamins; normal sun exposure *
7. All negative *
8. None *
9. One sister has arthritis *

Problem A-2

10. SGOT 30 units (N 15–29) SGOT 40 units (N 9–23) *
11. Calcium 4.6, phosphorus 1.8 mg/100 ml (N 9–11, 3–4.5) *
12. 58 K.A. units (N 5–13) *

Problem A-2, continued

13. Na^+ 142, K^+ 4.0, Cl^- 105, HCO_3^- 27 mEq/l (N 137–142, 3.5–5, 98–106, 21–28) *
14. 14 mg/100 ml (N 10–20) *
15. Serum iron 40, TIBC 380 micrograms/100 ml (N 80–130, 288–362) *
16. 1.0 unit (K.A.) (N 1–5) *
17. 23 ml/min (N 5–15) *
18. 125 Todd units (normal) *
19. 5% in 45 minutes (N 5 or less) *
20. 6.0 mg/100 ml (N 2.5–5) *

Problem A-3

21. No abnormalities noted *
22. Generalized demineralization; bilateral pseudofractures of upper femur and scapula *
23. 6% excretion (N > 8%) *
24. 30 gm fat in 72 hours *

Problem A-3, continued

25. Low flat curve *

26. 1 gm of 25 gm dose excreted in 5 hours (N 5-8) *

27. No abnormalities seen *

28. Dilated upper small bowel, segmentation and puddling *

29. No abnormalities seen *

Problem A-4

30. Moderate fatty infiltration *

31. Normal *

32. Erythroid hyperplasia. Absent iron stores *

33. Flattened epithelial villi; round cell infiltration *

34. Patient refuses *

Problem A-5

35. Ordered *

36. Given *

37. Given; serum calcium and phosphorus rise *

38. Gluten-free diet given resulting in marked improvement *

39. Given *

40. Given *

41. Ordered *

42. Ordered *

43. Done *

Lareau (1985) has noted that Part III of the board examination focuses on clinical skills and the ability of interns to evaluate patient information and make an appropriate decision regarding treatment. The medical profession is currently developing other assessment methods to better ascertain whether physicians have the requisite skills to be licensed.

In designing these examinations, the NBME—a nonprofit, independent organization—sought to develop a series of "qualifying examinations of such high quality that legal agencies governing the practice of medicine within each state may at their discretion grant a license without further examination for those who have completed successfully the examinations" (NBME, 1986). Although the amount of overlap between the FLEX and NBME examinations has increased over the last several years (in fact, the NBME assisted in the development of the FLEX II examination), the NBME series is recognized as being the most difficult (Lareau, 1985; Barrett-Connor, 1980).

Upon passing either the NBME or FLEX examinations, a physician is licensed to practice medicine. However, the testing of physicians does not generally end with the NBME and FLEX examinations. The vast majority of physicians seek specialties that require further training through residency programs. Medical specialties are governed by their own boards which establish standards and require training programs in teaching hospitals that may last from three to ten years. For example, a residency program in family medicine may require three years of further training, whereas a residency program in vascular surgery may require up to ten years of further training. In addition, most specialty boards now require their own professional examinations. Medical specialists must pass these examinations to become "board certified" in their area of expertise. Some specialty examinations require two days of testing including multiple-choice items and diagnostic simulations as well as oral questioning by a board examiner.

LAW

Bar examinations assess the applicant's ability to apply knowledge of basic legal principles to hypothetical (but realistic) fact situations. The applicant must then use legal reasoning skills to determine which facts favor each party, how the case should be resolved, or what is the appropriate rationale for this resolution. This approach to assessing the skills of potential attorneys is illustrated by the following multiple-choice item:

Questions 61–62 are based on the following fact situation.

Devlin was the owner of a large subdivision. Parnell became interested in purchasing a lot but could not decide between Lot 40 and Lot 41. The price and fair market value of each of those two lots was $5000. Parnell paid Devlin $5000, which Devlin accepted, and Devlin delivered to Parnell a deed which was properly executed, complete, and ready for recording in every detail except that the space in the deed for the lot number was left blank. Devlin told Parnell to fill in either Lot 40 or Lot 41 according to his decision and then to record the deed. Parnell visited the development the next day and completely changed his mind, selecting Lot 25. He filled in Lot 25 and duly recorded the deed. The price of Lot 25 and its fair market value was $7500.

61. Immediately upon learning what Parnell had done, Devlin brought an appropriate action against Parnell to rescind the transaction. If Devlin loses, the most likely basis for the judgment is that

(A) Devlin's casual business practices created his loss

(B) The need for certainty in land title records controls

(C) The agency implied to complete the deed cannot be restricted stricted by the oral understanding

(D) The recording of the deed precludes any questioning of its provisions in its recorded form.

62. Assume the following facts for this question only. Before Devlin had time to learn of Parnell's actions, Parnell sold Lot 25 to Caruso for $6000 by a duly and properly executed, delivered, and recorded warranty deed. Caruso knew that Devlin had put a price of $7500 on Lot 25, but he knew no other facts regarding the Devlin-Parnell transaction. Caruso's attorney accurately reported Parnell's record title to be good, marketable, and free of encumbrances. Neither Caruso nor his attorney made any further investigation outside the record. Devlin brought an appropriate action against Caruso to recover title to Lot 25. If Devlin loses, the most likely basis for the judgment is that

(A) The Statute of Frauds prevents the introduction of any evidence of Devlin's and Parnell's agreement

(B) Recording of the deed from Devlin to Parnell precludes any question of its genuineness

(C) As between Devlin and a bona fide purchaser, Devlin is estopped

(D) The clean hands doctrine bars Devlin from relief.

Almost all states use the Multistate Bar Examination (MBE). The MBE, developed in 1972, is a one-day examination consisting of 200 multiple-choice items. Six areas are covered by the MBE, including (1)

constitutional law, (2) contracts, (3) criminal law, (4) evidence, (5) real property, and (6) torts. Although states use the same examination, they set different cut-off scores.

In addition, each state develops its own essay test to further assess an applicant's ability to identify legal issues and facts in a case situation, identify the relationships among facts and issues, and present in writing an organized and coherent analysis of how the case should be resolved. A typical essay question might ask the applicant to explain why Party A's and Party B's actions did or did not lead to a valid contract between them and what effect this had on some other aspect of the case.[4] Each state also decides how to combine scores from the MBE and the state designed, administered, and scored essay examination.

In addition to the multiple-choice and essay testing of an applicant's knowledge of the law, some states have developed (or are in the process of developing) essay examinations to more closely assess how the applicant might perform as an attorney. In California, this performance assessment lasts six hours (constituting one-third of the entire bar examination) and serves to assess the legal, research, and other skills used in practice. Lareau (1985), in her assessment of the California bar examination, noted:

> Candidates are given two legal problems and have 3 hours to work on each problem. They are provided with a "file" of information that describes a legal problem they might encounter. In addition, they receive a "library" of background material necessary to analyze the legal problem including relevant cases, correspondence and supporting documentation. These materials can be quite lengthy, running between 40 and 60 pages of single space text.
>
> During the three hour examination period candidates are expected to review the materials and then perform several tasks that attorneys typically carry out. Candidates are given all the information necessary to perform the tasks; the examination is *not* an assessment of the candidates' knowledge of a particular area of law. Instead, the examination seeks to assess legal skills by requiring a demonstration, including writing a letter to the plaintiff's attorney; drafting a memorandum to a senior partner regarding the strategy for the case; or writing a brief for submission to a court of law.

[4]This type of question is analogous to asking a teacher to prepare a lesson plan on a given subject in the context of hypothetical factors that are related to basic principles of teaching. For instance, the teacher candidate would be told about the age and other salient characteristics of the children to be taught. It clearly differs from asking the teacher to present that plan. Similarly, the bar exam does not ask an applicant to orally counsel an actual client about the strengths and weaknesses of his case and alternative courses of action.

Klein's (1982) research on the California Bar Examination suggests that scores on the performance assessment correlate rather highly with other portions of the test. However, the performance assessment measures a distinct set of skills related, but not identical, to the skills measured by other portions of the test. The inclusion of performance testing as a part of the California Bar Examination represents a growing movement by the profession to increase the relevance of test items to realistic problems found in practice.

ARCHITECTURE

To become a licensed architect, a person must pass the Architectural Registration Examination (ARE). The development and grading of the ARE is handled by the National Council of Architectural Registration Boards (NCARB). However, the responsibility for licensing rests with state boards of architecture. (This responsibility is delegated to the state board by state government.) All of the state boards belong to the NCARB and have used the same licensing examination.[5]

To sit for the ARE, candidates must have at least eight years of experience under the supervision of a licensed architect. Educational experience may be substituted for seven of these eight years. Candidates can complete a three-, five-, or six-year accredited degree in architecture.[6] Other combinations of educational and architectural experience may be accepted. For example, a candidate may sit for the ARE if he or she has at least three years of training credits *or* has satisfied the Intern-Architect Development Program (IDP) requirements.[7] Each state registration board has the authority to establish requirements necessary for admission to sit for the NCARB examination and registration. Several registration boards have adopted the IDP training requirements as their training standard. However, all candidates must show proof of at least one year's experience under a registered architect to be eligible for the licensing examination.

In states that have adopted the IDP training requirements, the intern-architect's verified completion of these requirements is

[5]Recently, the California Board of Architectural Examiners (CBAE) announced that it would develop and administer its own state licensing examination in 1987. The dispute between the CBAE and the NCARB is focused on the NCARB's request that the CBAE ignore California law requiring that two portions of the test be graded by California architects.

[6]The architectural program must be accredited by the National Architectural Accrediting Board (NAAB).

[7]These requirements were developed by the National Council of Architectural Registration Boards.

necessary for admission to the professional examination. The IDP requires the intern to complete a total of "700 value units" or 5600 hours of "acceptable activity" in 14 training areas: (1) programming-client contact, (2) site and environmental analysis, (3) schematic design, (4) building cost analysis, (5) code research, (6) design development, (7) construction documents, (8) specifications and materials research, (9) documents checking and coordination, (10) bidding and contract negotiation, (11) construction phase-office, (12) construction phase-observation, (13) office procedures, and (14) professional activities.

The intern-architect must gain exposure to these 14 training areas under the guidance and assistance of a professional sponsor (the employer), a professional advisor (a registered architect outside the intern-architect's office), and an educator-advisor (a registered architect on the faculty of a school of architecture). Exposure to the 14 training areas can be acquired through participation, observation, or supplementary education. These three methods are defined as follows:

1. In participation, the intern-architect gains exposure by actually doing the work. This can be accomplished by working on the drafting board, attending related meetings, visiting construction sites, writing reports, researching products, and other such activities.
2. Exposure by observation occurs when the intern-architect does not have the opportunity to participate in a required activity but can observe other professionals performing the various activities.
3. When opportunities to be a participant or observer are not available to the intern-architect, exposure through supplementary education often is acceptable. This is usually accomplished after normal employment hours and can involve many different activities, such as attending seminars or programs sponsored by the AIA or other professional organizations.

It takes four days to complete the ARE. The exam consists of nine divisions:

Division A: Predesign (Day 3, 3 hours)

Application of the principles of land use planning with respect to the interrelation of the intended use or uses with the environment in which it is a part; the conversion of raw data, identification of missing data, evaluation of implications, establishing alternatives, and stating the building problem in terms usable for conceptual resolution to the building and site design development of service.

Division B: Site Design (Day 3, 3-1/2 hours)

The analysis and subsequent resolution of topographic, vegetation, climatic, and geologic aspects of sites and incorporation of the principles of land planning and utilization, site design, and aesthetics, in conjunction with the placement on a site of a building or group of buildings and/or other site improvements.

Division C: Building Design (Day 4, 12 hours)

The synthesis of programmatic and environmental requirements into a coherent and aesthetic concept through the processes of schematic design and design development.

Division D: Structural Technology – General (Day 1, 2-1/2 hours)

The identification, resolution, and incorporation of the technical aspects of construction in structural systems as related to the design of buildings.

Division E: Structural Technology – Lateral Forces (Day 1, 2-1/2 hours)

The identification and resolution of the effects of lateral forces on the technical aspects of the design of buildings and the processes of construction.

Division F: Structural Technology – Long Span (Day 1, 1-1/2 hours)

The identification, resolution, and incorporation of the technical aspects of long span design in the design of buildings and the process of construction.

Division G: Mechanical, Plumbing, and Electrical Systems (Day 1, 2-1/2 hours)

The identification and resolution of the technical aspects of construction as they relate to mechanical, plumbing, electric, and life safety systems with their incorproation into building design.

Division H: Materials and Methods (Day 2, 2-1/2 hours)

The evaluation and selection of materials and methods as related to the technical aspects of construction and their incorporation into the design of buildings.

Division I: Construction Documents and Services (Day 2, 3-1/2 hours)

The translation of design concepts, building materials, and systems into instruments of service for construction and the related construction administration of a building project (NCARB, 1986).

Most of the divisions use multiple-choice test items. However, portions of the test require candidates to produce graphic responses. For example, in the Division B test—Site Design—candidates are provided written simulation problems that require graphic responses. In addition, in the Division C test—Building Design—candidates are expected to resolve various issues (e.g., physical/technical, legal, perceptual, and economic) in developing a satisfactory solution to a building design problem. In doing so, candidates are expected to graphically communicate the selection and layout of building systems (by taking into account structural, mechanical, electrical, civil, and interior considerations). These responses are graded "holistically" and "individually" by trained examiners in regional grading sessions around the nation (NCARB, 1986).

The cut-off score for passing a division of the ARE is established by the NCARB in consultation with the Educational Testing Service which has a contract to develop and grade the test. The passing rate varies by division.[8] In general, the pass rate on the multiple-choice (and other) items is higher than on the graphic items.

In addition to the written examination, some states require an oral examination. In California, this examination is called the Qualification Appraisal Interview. The examination consists of a team of two or three registered architects reviewing a candidate's portfolio and asking questions (the actual oral exam lasts approximately 45 minutes). Members of the team reach a consensus about the candidate's performance and award either a "pass" or "fail" grade. Candidates may take the oral exam only after successfully completing all the written and graphic divisions of the ARE.

It is important to note that not all working architects are licensed. Some choose not to take the ARE; others failed it. However, architects without a license can work within the profession in certain capacities. Unlicensed architects can legally design buildings such as single family dwellings and can work on other projects under the supervision of a licensed architect. Although unlicensed architects can work within the profession, the lack of a license significantly constrains career opportunities (Lareau, 1985).

[8]In the June 1984 administration of the ARE, only 40.4 percent of the candidates passed the Structural (General) Division test whereas 74.7 percent of the candidates passed the Mechanical, Plumbing, and Electrical Division test.

ENGINEERING

An individual may be licensed (or "registered") as a professional engineer by the National Council of Engineering Examiners (NCEE) (through its state board members) after completing an approved program of study, passing two examinations, and demonstrating extended work experience.

Upon graduating from a state board approved engineering curriculum of four years or more, an individual may be admitted to sit for an eight-hour examination in the "fundamentals of engineering." Upon passing this examination and submitting three character references to the state board, an individual may be licensed as an engineer-in-training.

Upon providing a record of four or more years of "progressive experience" on appropriate engineering projects (as determined by the state board), an individual may be admitted to sit for an eight-hour examination in the "principles and practice of engineering."[9] Upon passing this exam and submitting five references (three of which references must be professional engineers having personal knowledge of the applicant's engineering experience), an applicant is qualified for registration as a professional engineer.

Thus, the components of licensing requirement are education, experience, and examination. The NCEE states that the principal purpose for the examination of candidates for professional engineering registration is to determine: (1) if the candidate has an adequate understanding of the basic and applicable engineering sciences, and (2) if training and experience have taught the candidate to apply these basic and applicable sciences to the solution of engineering problems in a minimally competent manner. The NCEE (1983a) asserts that:

> Minimal competency, as measured by the examination component of the licensing process, is the lowest level of knowledge at which a person can practice professional engineering in such a manner that will safeguard life, health, and property and promote the public welfare.

The Fundamentals of Engineering Examination (NCEE, 1983a) is given in two four-hour sections. It is an "open book" test in that one may use textbooks, handbooks, battery-operated, nonprinting (and silent) calculators, and slide rules. The test is intended to measure knowledge and understanding of the fundamental principles of the basic and engineering sciences, and the ability to apply these principles in solving engineering problems.

[9]Engineering teaching of advanced subjects and the design of engineering research and projects in a college or university offering an approved engineering curriculum of four years or more may be considered as engineering experience and may qualify an individual to sit for the "principles and practice of engineering" examination.

"Fundamentals" is a multiple-choice test. The first section includes 140 required questions on the following subjects:

Subject	Number of Questions
Chemistry	10
Computer programming	8
Dynamics	16
Electrical circuits	18
Engineering economics	6
Fluid mechanics	14
Materials science	6
Mathematics	17
Mechanics of materials	13
Statics	13
Structure of matter	5
Thermodynamics	14
Total	140

The second section includes 50 required questions and an additional 20 questions from selected subjects:

Required Subjects	Number of Questions
Engineering mechanics	15
Mathematics	15
Electrical circuits	10
Engineering economics	10
Total	50
Additional subjects (select two)	
Computer programming	10
Electronics and electrical machinery	10
Fluid mechanics	10
Mechanics of materials	10
Thermodynamics/heat transfer	10

"Principles and Practice" is a more open-ended examination whereby the examinee is required to respond to various situations. The examination is administered in eight hours and the examinee is expected to work eight problems (four each in two four-hour periods) in his or her discipline. The disciplines include aeronautical/aerospace, agricultural, ceramic, chemical, civil, electrical, fire protection, industrial, manufacturing, and mechanical engineering. For example, in chemical engineering, a question might be (NCEE, 1983a):

Situation:

On your first day with the Amalgamated Chemical Co., you are assigned the task of investigating the formaldehyde unit. As this unit was designed, dry air and methanol vapor in volume ratio of 6 parts air to 1 of methanol vapor and at a pressure of 1 atmosphere absolute is fed to a catalytic reactor, where normal conversion of the methanol to formaldehyde of 30% per pass is obtained.

Production of the formaldehyde has dropped. It already has been determined that the feed rate of methanol to the reactor is still correct. Last night the reactor effluent was analyzed with the following results:

Constituent	Mole %
Nitrogen	63.1
Oxygen	13.4
Water	5.9
Formaldehyde	4.1
Methanol	12.3
Formic acid	1.2

Requirements:

(a) Determine what single-pass conversion of methanol to formaldehyde is now being obtained.

(b) Determine the present air-methanol ratio in the feed.

(c) Where is the probable source of the trouble? Explain.

In addition, there is one engineering economics problem generic to all disciplines of engineering and it appears as the last problem in the second four-hour period of the examination. For example, an engineering economics question might be (NCEE, 1983a):

Situation:

The Benefit-Cost Ratio Method is used to evaluate alternative investment proposals within the Public Works Department of Anytown, California. A 10% discount rate is used in all economic analyses in the Agency.

The Agency is considering the purchase of snow removal equipment costing $800.00. If purchased, this equipment will result in net savings to the community of $175,000 annually. However, annual operating and maintenance expenses will be $60,000 annually. It is expected that the equipment will be used for twenty (20) years, at the end of which time it will be sold. The net residual value of the used equipment will be essentially zero at the time of sale.

Requirements:

(a) Determine the benefit-cost ratio for this proposal if one defines "benefits" as benefits to users less operating and maintenance expenses.

(b) Determine the benefit-cost ratio for this proposal if one defines "costs" as the total of capital costs and annual operating and maintenance expenses.

(c) The benefit-cost ratios computed in requirements (a) and (b) above are, of course, somewhat different. What procedure is "correct"? Explain why.

(d) The County has offered to provide snow removal service to the City for a contract price of $235,000 annually. The benefits to the City are expected to be $282,000 annually. (These benefits are somewhat larger than that which would be expected if the City provided its own service because of the larger area served.) The benefit-cost ratio for the County-provided service is thus $282,000/$235,000 = 1.20. Using the Benefit-Cost Ratio Method properly, determine which alternative should be preferred by the City:
(1) Use their own equipment or
(2) Purchase service from the County.
Show all calculations.

Each state engineering board is autonomous but all have agreed to work within the guidelines established by the model law of the NCEE. Each state board has specific requirements for being admitted to the examinations and for being licensed. The state boards administer the uniform NCEE examinations, review the prospective engineers' files, and determine whether or not to grant a license. It is the board's responsibility to evaluate education, training, and experience of applicants for registration. A major task of the state board is to contact the applicant's references and determine whether or not standards have been met and "it is safe for the engineer to practice."

However, not all graduates of engineering programs sit for the fundamentals and principles and practices examinations. For example, a nationwide survey in 1983 indicated that only 59 percent of graduating engineering students sat for the fundamentals examination.[10] It is

[10]This figure represents a continuing downward trend in the percentage of graduates who sit for the professional examinations. In 1976, 71 percent of the graduating engineering students sat for the fundamentals examination.

estimated that only 33 percent of those who take the fundamentals examination sit for the principles and practice examination four years later. Engineering educators point to career moves into management and sales as the primary reasons why graduates do not sit for these examinations (NCEE, 1985). In response to these trends, the NCEE has undertaken a national program to educate potential engineers on the importance of taking the examinations and obtaining the professional license.

As we have described, the professional examination and licensure process in medicine, law, architecture, and engineering differ quite a bit from those presently used in education. Although most of the examinations for licensure include primarily multiple-choice test items, they also include other methods of assessment (essays and simulations as well as oral examinations). Many of the multiple-choice items are situation-specific and require the student to apply theory to practice. The professions have elaborate systems for grading the examinations. Graders are members of the profession and undergo comprehensive training.

The professional examinations are administered through a complex governance structure. Lareau (1985) has summarized some critical aspects of the professional governance structure:

> Formally, authority for licensing candidates rests with the state legislature and is delegated to state boards of examiners. In most of the professional groups, the state board of examiners is responsible for developing, administering, and scoring examinations. Each state has a separate state board and the regulations and procedures can vary significantly across states.
>
> Although formal authority rests with state boards, some professions (including architecture and medicine) delegate authority for developing and scoring the examination to a national body. In these instances, all 50 state boards belong to the same organization. This national organization develops a single test that all 50 state boards choose to use. . . .
>
> State boards receive formal and informal input from a wide variety of state and national professional associations. At times, a professional association exerts influence through individual members. At other times, the association has a formal role in the development of an examination. The precise configuration varies by profession and within each profession, by state. There are literally hundreds of organizations involved in the development, administration, scoring and review of professional examinations, leaving open questions about the formal versus informal nature of control and the precise contribution of professional organizations to the exam. . . .

Nonetheless, the role of the professional association and the licensing examinations described in this section contribute a great deal to the trust that exists between the public and the profession and its practicing members. In some cases, the profession examines the prospective new member on several occasions to ensure that the novice has an adequate knowledge base and can apply that knowledge to the problems he or she will face. Although the examinations play an important role, most professions recognize the limitations of examinations. Thus, professions expect new members to pass muster on several accounts—including an undergraduate liberal arts education, a meaningful admissions test to a professional school, an intensive professional education, and licensure examinations taken over several days. In addition, the professions are placing greater and greater emphasis on supervised internships.

The processes of assessing and licensing physicians, lawyers, architects, and engineers are quite different from the process currently used to assess and license teachers. These processes are the key to ensuring the public that only competent professionals are granted the license to practice. If teachers are properly assessed, then the public will likely grant them the authority to make appropriate instructional decisions on the behalf of their students. In this way, teachers, like physicians, lawyers, architects, and engineers—properly trained and assessed before licensure—will be expected to use professional judgment in making appropriate decisions on behalf of their clients.

Appendix B

A BRIEF REVIEW OF BEGINNING TEACHER PERFORMANCE ASSESSMENT

According to a survey conducted by the Educational Testing Service, 11 states have implemented (or are in the process of implementing) a performance assessment program for beginning teachers (Goertz, 1986). The novices must pass the performance test before they are granted regular certification. In these states, teachers generally receive provisional certification when they complete their teacher preparation programs and meet other state requirements. They are formally assessed on their teaching performance during their first year(s) in the classroom as full-time teachers. The beginning teacher is observed and evaluated two or three times a year, using a state-developed instrument that covers classroom management, interpersonal skills, professional standards, etc. The evaluators, who are trained in this procedure, may recommend that the teacher (1) receive regular certification, (2) participate in in-service training and be re-evaluated, or (3) not be certified.

The beginning teacher programs in the 11 states vary considerably and are in various stages of development.[1] Below is a brief description of the 11 programs within the context of its state's certification process:[2]

FLORIDA

Teaching candidates must first pass the Florida Teacher Certification Exam, which measures basic skills, professional education competencies, and writing skills. Before receiving initial certification valid for five years, a beginning teacher must complete a year-long internship. This internship, known as the Beginning Teacher Program, requires one year of supervision and evaluation of the new teacher's mastery of the generic competencies measured by the Florida Performance Measurement System. Statewide tests of subject matter competencies are presently being developed.

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[1]Three other states—Minnesota, New York, and South Dakota—are planning to implement a performance assessment program for beginning teachers.

[2]These descriptions are compiled from AACTE (1986); Goertz (1986); and Sandefur (1986).

GEORGIA

Prospective teachers must have a 2.5 college grade point average for entry into a teacher education program. Then, teacher candidates must pass two tests to be granted a "performance-based certificate" valid for three years. Initially, the candidate must pass the Georgia Teacher Certification Test (required since 1978), which measures subject-matter knowledge. Then, beginning teachers will receive a nonrenewable certificate valid for three years, during which time they must demonstrate acceptable performance on 14 generic competencies. This on-the-job assessment is conducted using the state-developed Teacher Performance Instrument.

KENTUCKY

Prospective teachers must have an overall 2.5 grade point average (GPA) for entry into a teacher education program. Then, teacher candidates must pass the NTE (cutoff scores are as follows: 637 for general knowledge, 641 for professional knowledge, and 643 for communication skills) as well as basic literacy and mathematics proficiency examinations (the Comprehensive Test of Basic Skills is used). Beginning teachers must also successfully complete a one-year internship before receiving a certificate valid for four years. Renewals are based upon the completion of a master's degree program and other advanced training and experiences and are valid for five years.

MISSISSIPPI

Prospective teachers must have an overall 2.5 GPA for entry into a teacher education program and must pass an entry assessment of basic skills. Teacher candidates must graduate with at least a 2.5 GPA. Then, teacher candidates must pass the NTE (cutoff scores are as follows: 639 for general knowledge, 639 for professional knowledge, and 644 for communication skills). These scores are intended to be raised by 1988. Beginning teachers must also successfully pass a performance-based evaluation during their first three years of teaching. Beginning in Spring 1988, all beginning teachers will be issued provisional certificates. Support and evaluation for each beginning teacher will be required from local education agencies.

NEBRASKA

The state legislature has recently mandated that prospective teachers must pass basic skills and subject matter competency tests. The preprofessional skills test has been selected for use as the instrument for entry into teacher education programs. Piloting and validation took place in 1985–1986, cutoff scores are being set, and implementation is set for Fall 1986. The legislature has also authorized the State Board of Education to develop an "entry level assistance program" to help beginning teachers. The state's Council on Teacher Education has recommended the following internship requirements:

> A three-year apprentice/provisional certificate will be granted to beginning teachers. The novices will be supported by a three-member observation and evaluation team. Evaluations will take place in the first year. If the intern does not meet established standards, then the degree granting institution of higher education will pay for the continued supervision and remediation.

The plan is presently under consideration and no funds have yet to be provided for implementation. However, some education service units are piloting similar programs.

NORTH CAROLINA

Teacher education students cannot be admitted to university or college programs unless they pass the NTE general knowledge (with a cutoff score of 627) and communication skills (with a cutoff score of 632) components. In 1986, these cutoff scores will be raised to 631 and 636, respectively. At the end of their program, teacher candidates must pass the NTE professional knowledge (with a cutoff score of 644) and content area (with cutoff scores ranging from 470 to 550) components. A task force on the preparation of teachers is under mandate of the state legislature to consider raising these cutoff scores. Beginning teachers are issued a two-year initial certificate during which they will be evaluated and provided support. A three-year continuing certificate is issued at the end of this provisional period. (A certificate is then renewed for five-year periods.)

OKLAHOMA

Prospective teachers must have at least a 2.5 GPA to be admitted to a teacher education program. In 1986–1987, the State Board of Regents will be validating and piloting the NTE preprofessional skills test to be used as a statewide basic skills examination. Since 1982, the state has required prospective teachers to pass a content area examination (developed by NES) in the subject field for which they are seeking certification. Beginning teachers are granted an initial license for one year during which they are supervised and evaluated by a three-member team. If needed, this license can be renewed once. The regular certificate is granted after the successful completion of the internship year and is valid for five years. The state provides $500 to the participating teacher consultant and travel expenses for the participating university consultant.

PENNSYLVANIA

Effective in 1987, prospective teachers will be required to pass tests of basic skills, general knowledge, professional knowledge, and subject matter competency before receiving an initial certificate. A one-year internship will then be required before receiving a regular certificate.

SOUTH CAROLINA

Prospective teachers are required to have a 2.5 GPA as well as pass a basic skills test (the South Carolina Education Entrance Examination) for entry into a teacher education program.[3] Teacher candidates are required to pass the NTE content area examination in their field to receive certification. The state is currently developing its own professional knowledge examination, which will also be required for certification. The state developed an assessment instrument to be used for teacher evaluation. All beginning teachers must be evaluated three times with this instrument (Assessment of Teaching Performance) and twice during their second year of service.

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[3]A 2.0 GPA is acceptable for those students who graduated in the top 50 percent of their high school class.

TENNESSEE

Prospective teachers must have a 2.5 GPA for entry and exit from a teacher education program. Prospective teachers must also pass the NTE preprofessional skills tests (with cutoff scores set at 169 for math, 169 for reading, and 172 for writing). The State Board of Education mandated that the NTE core battery and appropriate subject area tests be taken by all teacher candidates and that specified cutoff scores be attained as a condition for receiving a probationary certificate. The core battery cutoff test scores have been set at 640 for communication skills, 637 for general knowledge, and 631 for professional knowledge. The State Board postponed the subject area examination requirement until specialty area exams are developed for areas in which there are none available. The state's beginning teacher program is currently being implemented within the context of the state's well-publicized career ladder program.

VIRGINIA

Prospective teachers must pass the NTE before being issued a two-year, nonrenewable, provisional certificate. The state legislature has mandated the use of the NTE requiring cutoff scores of 649 in communication skills, 639 in general knowledge, and 639 in professional knowledge. Eighteen subject area exams are also required for initial certification. In addition, institutions of higher education are voluntarily raising GPA requirements for entry into teacher education programs. In 1985, the state initiated a beginning teacher program. This program, the Beginning Teacher Assessment Program, requires that a new teacher be assessed on the basis of observations by three independent observers. This evaluation includes the assessment of whether or not the novice has mastered 14 generic teaching competencies. If a beginning teacher has not met the standards, then a remediation program is initiated (at one of the state's regional centers). If upon retesting, provisional teachers do not meet state standards, they will be denied regular certification.[4]

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[4]For example, for the 1986 Spring semester, the state reported that 69 percent of the beginning teachers (n = 319) passed 12 of the 14 skills tested. The 31 percent who failed will lose their teaching certificates if they do not pass in two more attempts. These results were an improvement over the Fall 1985 assessment when only 55 percent of the beginning teachers (n = 668) passed. During the Fall assessment, the beginning teachers were required to pass only 10 of the 14 skills. However, of the 45 percent who failed in the Fall, 98 percent passed when evaluated again. Only six teachers failed the second assessment and they will have one more chance to pass.

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